THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The iron trade still presents strong contrasts to the high-pressure conditions of 1902, yet the volume of business will compare favorably with what have been rated ordinary times. The exhaustion of stocks in consumers' hands and a steady, strong rate of consumption in all lines are indicated by current buying; yet doubt as to the future is still the dominant influence. Resistance to any pressure that would carry prices measurably below the present level is apparent in both pig iron and finished material, yet there is no positive development to give assurance that the present level can be maintained. Contract buying is of such small proportions as to give little clue to the requirements of consuming interests. What is known is that the important buyers are frequently in the market and that close connection is being made in many cases between producers and consumers' yards. The effort of the Southern furnaces to secure a reduction of 50 cents in freight to the Ohio River was unsuccessful, the railroads answering that the time had not yet come for such a concession. Similar freight reductions would have been asked from Northern roads. At present Central Western furnaces are quoting under the $11.75 Birmingham basis for No. 2 foundry, sales at Pittsburg being reported at $15.85, which would mean $11 at furnace for Southern competitors. This may have given rise to the reports of $11 Southern iron. No such sales can be traced, however, though 3,000 tons of Southern iron has been bought in the week by the leading agricultural machinery interest, and 2,300 tons by an Ohio cast iron pipe foundry, on a basis equivalent to $11.50 Birmingham. Gray forge iron has declined further and Pittsburg sales are reported at $15. Purchases of Bessemer iron by the United States Steel Corporation for the fourth quarter are still delayed and it is a matter of speculation whether the policy heretofore followed will continue or whether the Bessemer iron market will be allowed to find its own level. Steel works, owing to the decreased demands upon finishing mills are producing more steel than is going into consumption, and there may be some curtailment in addition to that already made in the Pittsburg and Valley districts. Steel has been sold by independent producers below the $27 Pittsburg basis established by the pool, and a meeting of the steel billet association is expected in the near future to consider prices. Conversion arrangements at the present price for Bessemer pig iron make it possible to secure steel below association prices. The Chicago district reports sales of 2,000 tons of Bessemer and open-hearth billets in lots of several hundred tons. Finished material markets have been quiet in the past week. Steel bar manufacturers met in Pittsburg this week and reaffirmed prices, the contention being that contracting would not be stimulated by a reduction. Meantime Western consumers of steel bars are buying in a small way, though some further contract business is reported from Eastern implement concerns. The bar iron situation is not improved, mill contracts being generally on a 1.50c basis at mill, which has been shaded on the largest business. The plate manufacturers will meet in New York this month, but no change in prices is expected. Mills are booked but a short distance ahead, and the demand for steel car purposes has been falling off. The wire industry still reports favorable conditions, with good prospects for the fall trade in the West, in view of the crop outcome.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Sept 9.

With the exception of some further weakening in the pig iron market, there has been little change in the general iron and steel situation in the past week. There has been considerable buying of pig iron in small lots for immediate delivery, orders ranging from 25 to 50 tons. The buying of finished products for early shipment is also somewhat better, but the buying for future requirements has not yet set in in this district. Northern No. 2 foundry has been sold in small lots during the week at prices ranging from $15.85 to $16, Pittsburg. One lot of 800 tons of Bessemer iron for early delivery was placed at $16, Valley furnace, while 1,400 tons of basic iron was sold at $16.10 at the furnace. Gray forge is held at $15 to $15.25, Pittsburg. These quotations leave a very small margin of profit to some of the less modern stacks in the Mahoning and Shenango valleys, and if a further drop in prices should come it would no doubt result in the banking of a number of stacks. The Southern furnace operators did not succeed in securing a 50-cent reduction on iron to Ohio river points, the traffic managers, at the conference held in Birmingham, Ala., Friday, Sept. 4, having decided that "the time has not yet arrived for making a reduction in the rate." Doubtless the demands of Northern furnace operators for reduced freights on coke, should a reduction be granted by the Southern roads, had much to do with this decision, as a reduction at this time would no doubt establish a bad precedent from a railroad traffic manager's point of view. A meeting of the Southern pig iron association was also held last week and the advisability of making a $1 reduction on shipments east of a line running through the central portion of Pennsylvania was discussed, but no definite action was taken. Last April such a differential was made, but it did not hold for any length of time, as the operators were compelled to make the same quotations to Western consumers as to those in the East. It has been reported that some of the association furnaces are taking business below the association basis but this is denied. Outside furnaces are, however, shading prices, and the association furnaces are doing only a small-lot business on the present basis.

A meeting of the steel bar manufacturers was held in this city yesterday and ruling quotations were reaffirmed. While a large number of consumers of steel bars have waited months for concessions, it was argued at the meeting that concessions at this time would retard rather than

encourage the placing of orders, and while it is not anticipated that there will be any heavy buying for future deliveries it is believed that considerable business will be placed shortly to cover immediate requirements. A meeting of the shafting manufacturers is being held in New York today, and the indications are that prices will again be reaffirmed. There has been some talk of an early meeting of the billet association and it is probable that one will be called shortly. The weakening of the Bessemer pig iron market, and the present conversion "spread" of $9 per ton has made it possible to shade the association quotations from 50 cents to $1 per ton, and there is a probability that action will be taken whereby such prices can be met by the steel producers. There is very little buying of heavy steel, and owing to the curtailed requirements of the finishing mills, there may be a still further reduction in the productive capacity of the steel mills for a brief period. Plates and structural shapes continue in little demand, and so far as the requirements of the steel car plants is concerned the mills expect a shortened tonnage for some months to come.

Pig Iron.—During the week Southern No. 2 has been sold in this market on a basis of $11.25, Birmingham, for delivery to a foundry outside of this district. This price is equivalent to $16.10, Pittsburg, and is the quotation the Southern operators hoped to make regularly with a 50-cent reduction in freight rates. Small lots of Northern No. 2 have sold at prices ranging from $15.85 to $16, while gray forge is quoted at $15 to $15.25. Sales of Bessemer iron have been made at $16 at the furnace and basic at $16.10. It is true that the bulk of the iron now being shipped from the merchant furnaces in the valleys is at prices considerably above these quotations, but the contracts were closed months ago when the market was from $2 to $3 per ton above the present basis. On this basis the sales of Bessemer iron on shipments made during the month of August netted the furnacemen $18 per ton, but the present month will no doubt see a reduction in this average price. It is doubtful if the United States Steel Corporation will come into the market this month to cover requirements for the last quarter, and other large steel producers who have been heavy buyers of steel-making irons in the open market in the past are now selling small lots of iron in the open market. The list of idle furnaces in this and the Valley districts has not been increased during the week, and should there be a change in the market for the better within the next few weeks a number of the idle stacks now out will no doubt come in before the end of the month. The blast furnace workers in convention at Youngstown, O., last week decided to ask for an 8-hour day on May 1 next, but unless there is a very great improvement in the general situation within the next six months their demands cannot possibly be granted. We revise quotations as follows:

Bessemer, Valley	$16 00 to 16 50
Bessemer, Pittsburg	16 85 to 17 35
No. 1 Foundry	16 50 to 16 75
No. 2 Foundry	15 85 to 16 25
Gray Forge, Pittsburg	15 00 to 15 25
Chilled Basic, Valley	16 10 to 16 35
Chilled Basic, Pittsburg	16 85 to 17 10

Steel.—A meeting of the steel billet association will be held shortly to review the general situation and to provide against the cutting of the present basis as now being done on conversion arrangements. Steel output in this district continues greatly curtailed and none of the idle mills hereabout have resumed operations during the week. There is some talk of further curtailing steel production by the shutting down temporarily of a number of plants in both the East and West, but no action along this line has yet been taken. We make the following quotations: Bessemer billets 4x4 inches and slabs up to and including .20 carbon, $27, Pittsburg, Wheeling or Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; .21 to .60 carbon, $1 advance, and .61 to 1.00 carbon, $2 advance; open-hearth billets up to and including .60 carbon, $28, and over .60 carbon, $29; billets smaller than 3⅞-inch and sheet and tin bars are $1 per ton extra; Bessemer rods, $35.50 to $36 and open-hearth are held at $1 advance.

Ferro-Manganese.—Domestic 80 percent is held at $49 per ton in carload lots, delivered at buyer's mill. No doubt this price could be shaded on a desirable tonnage.

Spelter.—The market continues exceedingly firm and prime Western grades continue to sell at 5.83½c to 5.85c, Pittsburg.

Skelp.—Steel skelp is exceedingly weak, and there is little demand. Both grooved and sheared is held at 1.60c to 1.65c, Pittsburg. Grooved and sheared iron skelp is quoted at 1.75c to 1.85c.

Muck Bar.—The market is exceedingly quiet, and prime muck can be had at prices ranging from $29 to $30.

Rails and Track Material.—There has been little buying of standard sections during the week, while light rails continue very quiet. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 8 pounds, in carload lots, $39; less than carload lots, $40; 12 pounds, $33.50; 16 and 20 pounds, $32.25 to $33; 25 to 40 pounds, $32 to $32.50. Track material: Spikes, 2.05c to 2.10c; track bolts, square heads, 2.05c; hexagon heads, 2.65c; fish plates, 1.60c on orders accompanying large rails contracts, otherwise 2c to 2.10c is asked.

Plates.—Specifications on plates from steel car manufacturers and shipbuilders are falling off from day to day, and new contracts in both lines are exceedingly scarce. A meeting of the plate manufacturers will be held in New York this month, but it is doubtful if the present basis will be disturbed. We quote: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plate 3-16-inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds, for less than carload lots. Terms, net cash, in 30 days.

Structural Material.—Buying for immediate delivery is somewhat better than it has been for several weeks, but none of the mills have specifications for more than two or three weeks' operation. We quote: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Bars.—At a meeting of the steel bar manufacturers held here yesterday prevailing quotations were reaffirmed. There has been a little further buying on the part of Eastern consumers during the week, but the large Western consumers are still out of the market. Reaffirmed prices are as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.70c; over 3 inches, 1.80c; common bar iron, 1.60c to 1.65c, Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

Sheets.—The market is quiet and independent producers continue to shade the quotations of the American Sheet Steel Co. Black sheets in 500-bundle lots and over are quoted as follows: No. 28, 2.65c to 2.70c; No. 27, 2.55c to 2.60c; No. 26, 2.45c to 2.50c; Nos. 22 and 24, 2.35c to 2.40c; Nos. 18 and 20, 2.25c to 2.30c; Nos. 14 and 16, 2.15c to 2.20c; Nos. 10 and 12, 2.05c to 2.10c. Galvanized: No. 16, 2.55c to 2.60c; No. 18, 2.80c to 2.85c; No. 26, 3.30c to 3.35c; No. 27, 3.55c to 3.60c; No. 28, 3.80c to 3.85c; No. 29, 4.30c to 4.35c; No. 30, 4.45c to 4.50c.

Pipes and Tubes.—There is no abatement in the demand for these products and large orders entered now cannot

be delivered before December. We quote as follows in carload lots to consumers, f. o. b. Pittsburg, plus freight according to Tube Rate Book to destination:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Wrought Iron Pipe. Black. Percent.	Wrought Iron Pipe. Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	69	59	66	56
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Cut 3 to 6 feet				
⅛, ¼ and ⅜ inch	63	53	60	49
½ inch	65	54	62	51
¾ to 6 inch	71	60	68	57
7 to 12 inch	65	53	61	50
Cut 6 feet and longer				
⅛, ¼ and ⅜ inch	64	53	61	50
½ inch	66	55	63	52
¾ to 6 inch	72	61	69	58
7 to 12 inch	66	54	62	51
Extra Strong Plain End				
⅛ to 8 inch	67	57	63	53
Threads only	66	56	62	52
Threads and Couplings	65	55	61	51
Double Extra Strong Plain End				
½ to 8 inch	59	49	55	45
Threads only	58	48	54	44
Threads and Couplings	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent.
1 to 1¼ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	36½
2¼ to 5 inches	45½
1¾ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

Wire and Wire Nails.—Demand for wire nails and wire products generally continues excellent and the jobbers are buying heavy to fill out their stocks. There are large stocks in manufacturers' hands. Prices remain unchanged as follows: Wire nails, carload lots, to jobbers, f. o. b. cars, Pittsburg, $2; plain wire, carload lots, $1.90; barb wire, carload lots, $2.30; staples, carload lots, $2.20. Galvanizing 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $2.15, and less than carload lots, $2.20, f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2.25 in carload lots and $2.30 in less than carload lots. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—A meeting of the shafting manufacturers is being held in New York today, but no change in present prices is expected. We make the following quotations: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots. Tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. Tool steel is quoted 7 cents and upwards, according to the grade.

Old Material.—Dealers are now buying in large quantities owing to the exceedingly low quotations prevailing. There will be little buying of heavy melting stock on the part of the large steel producers for several months, as all have large accumulated stocks. Heavy melting stock is quoted at $17.50 to $18, gross tons; No. 1 cast scrap is quoted at $15.50 to $16, gross, but there is little buying, and with the pig iron market declining, a further decline in the price of this product is expected. Turnings and borings have been purchased by dealers from mills at prices ranging from $7 to $8, gross, while busheling scrap is held at prices ranging from $12 to $13.50, according to quality.

Coke.—For the week ending Saturday, Aug. 29, the production of the Connellsville region increased over 5,000 tons over the production of the previous week. The production of the upper region was 249,700 tons and that of the lower region 50,695 tons. The general coke situation has not improved to any great extent and low prices continue to be named both for Connellsville and mountain products. Connellsville furnace coke is held at $2 to $2.50 and foundry at $2.25 to $2.75. Outside furnace coke is held at $1.50 to $2 and foundry at $2 to $2.25.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, Sept. 8.

Not for some time has the finished iron and steel market been so quiet as during the week under review. The only materials in which any activity was developed were steel bars and wire nails and fencing, for which a fair demand has been in evidence. Efforts to stimulate trading in iron bars and sheets by making concessions from prices have failed, and the buying of these products has been without interest. There has been some trading in billets, small lots of Bessemer having sold at prices reported below the circular basis. Scrap shows no improvement either in demand or values, the market being a waning one. A better tone is evident in pig iron, though the character of the buying is unchanged, carload orders predominating. Other materials remain relatively in the same condition as during the past month, buying being of a light order.

Pig Iron.—There is no material change to report, unless it be the prevalence of a more optimistic opinion among sellers as to the outlook. A review of the sales of the week gives no real cause for this change in feeling, but the fact remains that the undertone of the market is considerably stronger today. Trading is still confined almost exclusively to small lots for quick shipment, a practice of buying indulged in by melters of all capacities. Some contracts for larger tonnages have been taken, but at the expense of prices. Perfect confidence in the stability of the market among foundrymen is far from complete if the character of their orders is any criterion. They still prefer to buy once or twice a month in lots from carloads up to 100 tons, paying 25 cents a ton more for it, but getting quick shipment in return, rather than to purchase their season requirements at one time. The aggregate tonnage of orders of this kind, however, is very large, taking up the daily output of all the furnaces in the market. Few producers have any stocks on hand, and the price of $12, Birmingham, is firmly maintained on spot business. Reports of prices made below $11.75—the association quotation on contract business—are numerous, some statements being that $11.25 and $11 have been reached. The leading agricultural implement interest placed orders last week for 3,000 tons of Southern No. 2 foundry at a price below $11.50, Birmingham, and also for 1,600 tons of Northern No. 3 foundry at less than $15.75, Chicago. Other big business included an order for 1,000 tons of malleable Bessemer at $17.50 Chicago, and a number of 500-ton orders for foundry grades. Our quotations follow:

Lake Superior charcoal	$18 50 to 19 00
Local Coke Foundry No. 1	17 50 to 18 00
Local Coke Foundry No 2	17 00 to 17 50
Local Coke Foundry No. 3	16 50 to 17 00
Local Scotch Foundry No. 1	17 50 to 18 00
Southern Coke No. 1	16 35 to 16 85
Southern Coke No. 2	15 85 to 16 35
Southern Coke No. 3	15 35 to 15 85
Southern Coke No. 4	14 85 to 15 35
Southern No. 1 soft	16 35 to 16 85
Southern No. 2 soft	15 85 to 16 35
Southern Gray Forge	14 85 to 15 10
Southern Silverics (4% to 5% silicon)	18 35 to 18 85
Southern Silverics (5% to 6% silicon)	18 85 to 19 35
Jackson Co. Silveries (6% to 8% silicon)	20 30 to 21 30
Jackson Co. Silveries (8% to 10% silicon)	21 30 to 22 30
Ohio Strong Softeners	21 00 to 22 00
Alabama and Georgia Car Wheel	25 35 to 26 35
Malleable Bessemer	17 50 to 18 00
Basic iron	16 35 to 17 35

Billets.—There has been a light demand for Bessemer billets, and one lot to a local consumer is reported to have been sold below fixed prices. Open-hearth forging billets in carload lots are in fair demand. We continue to quote Bessemer billets, $28; open-hearth, $29, and forging, $32.

Bars.—Trading in iron bars continues light, buyers covering only for early requirements. Prices are weak and of a downward tendency. Steel bars are moving briskly, several consumers having placed season contracts during

the week. The tonnage bought, however, is not as large as might be expected, judged from the volume of inquiry. Prices are without change as follows: Mill shipments, Chicago delivery, iron, 1.55c to 1.60c; Bessemer steel, 1.76½c; angles, less than 3x3, 1.86½c base; hoops, in lots of 250 tons and greater, 2.06½c; less than this amount, 2.16½c. Quotations from store, less than carload lots, iron, 2c to 2.10c; steel, 2c; hoops, 2.30c to 2.40c; angles, 2.10c rates.

Sheets.—A moderate demand for heavy gauges in small lots is noted. Prices are still being shaded. Quotations of the leading interest on black sheets, mill shipments, f. o. b. Chicago, are for No. 27, 2.81½c to 2.91½c; No. 28, 2.91½c to 3.01½c. Other producers are offering these sizes at the following prices: No. 27, black, 2.76½c to 2.86½c; No. 28, 2.86½c to 2.96½c. Galvanized sheets from mill, carload lots, Chicago delivery, are quoted 75 and 10 to 75 and 10 and 2½ percent. On lots from store, we quote No. 27, black, 2.90c to 3.05c; No. 28, 3.05c to 3.15c. Galvanized, 75 to 75 and 5 percent.

Plates.—New business continues to be of limited proportions, though specifications are of good volume. Store trade is active. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c; flange steel, 1.85c. Prices for lots from stock, tank steel, ¼-inch and heavier, 2c to 2.10c; 3-16, 2.10c to 2.15c; No. 8, 2.15c to 2.20c; No. 10, 2.30c to 2.35c; flange steel, 2.40c to 2.50c.

Structural Material.—While a good sized tonnage in shapes is pending the volume of business placed with mills is of small proportions. Even specifications have fallen off to some extent. The movement from warehouse stocks in small lots is brisk. We quote mill shipments, Chicago delivery as follows: Beams and channels, 16 inches and under, 1.75c; 18 inches and over, 1.85c; universal plates, 1.75c; angles, 3x3 and larger, 1.75c; tees, 3x3 and larger, 1.80c; zees, 1.75c. Lots from store, 2.10c to 2.25c per 100 pounds, rates.

Merchant Steel.—Contracts for season requirements have been placed with mills during the week under review, though the total tonnage is not large. Specifications come in freely for all materials. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c, flat sizes; concave and convex, 2.25c; cutter shoe, 2.50c to 2.60c; machinery steel, 2.15c to 2.25c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.35c to 2.45c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; special, 13c and upwards; less than carload lots, 5 and 10 percent higher; cold rolled shafting, carload lots, 47 per cent off; less than carload lots, 42 percent off.

Merchant Pipe.—Producers report there is no diminution in the volume of business from all classes of consumers and that the outlook for trade this winter is satisfactory. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¾ in. inclusive	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	71.85	61.85
7 to 12 inches inclusive	67.35	57.35	64.35	54.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—A fair amount of business is placed with mills from week to week, there being no indications of any lessening in consumption. Prices are without change as follows:

	L. W. Steel. Percent.	C. C. Iron Percent.
1 to 1½ in.	43.35	38.35
1¾ to 2½ in.	55.85	35.85
2¾ to 5 in.	60.85	45.85
6 to 13 in.	55.85	35.85

For lots direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron Percent.
1 to 1½ in.	40	35
1¾ to 2½ in.	50	32½
2¾ to 5 in.	57½	42½
6 to 13 in.	50	32½

Cast Iron Pipe.—The leading interest reports no change in the situation, buying being of small volume. The scarcity of cars at all its plants is still a harassing feature, seriously delaying shipments. We quote carload lots, f. o. b. Chicago, 4-inch water pipe, $31; 6-inch, $30; 8-inch and upwards, $29; gas pipe, $1 a ton higher.

Rails and Track Supplies.—In light rails and track supplies a good business has been placed. Heavy rails are quiet, most of the mills being filled up for the major portion of next year. We quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality, rails, $27; 25-pound rails, $32 to $34; 12-pound rails, $39 to $40, with regular differentials for intermediate sizes. Track supplies, mill shipments: Angle bars, 2c to 2.10c; spikes, first quality, 2.20c (out of store, carload lots, 2.25c to 2.35c rates); second quality, 2.10c; track bolts, 3½x¾ with square nuts, 2.85c to 3c per 100 pounds; with hexagon nuts, 3c to 3.10c, with usual differentials for other sizes.

Wire and Wire Nails.—Demand for nails and open fencing is brisk, jobbers in all sections of the West sending in good-sized orders and specifications. The indications of good crops this year have stimulated trade in these products, and some mills are hard pressed to make shipments within the time required by all customers. Quotations to jobbers, Chicago delivery, follow: Wire nails, carload lots, $2.20; less than carload lots, $2.30. Cut nails, steel, carload lots, $2.26½; less than carload lots, $2.36½. Plain wire, $2.10 carloads, and $2.20 in small lots; galvanized, carloads, $2.40; smaller lots, $2.50c. Barbed wire, carloads, $2.50; less than carloads, $2.60; galvanized, carloads, $2.80; less than carloads, $2.90; staples, carloads, $2.30; smaller lots, $2.40; galvanized, carloads, $2.60; small lots, $2.70. Bale ties, 82½ and 5 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Coke.—This is essentially a waiting market, buyers not caring to contract far ahead owing to the unsettled condition of the metal trade. Spot coke is largely in demand, at $5.65 to $6.15 for Connellsville. Virginia and West Virginia grades are quoted as follows: New River, $4.65 to $5; Pocahontas, $4.65 to $5; Stonega, $4.85 to $5.25.

Old Material.—No appreciable change is to be noted in the situation, and prices are still declining. Steel scrap of all kinds is "absolutely dead," as one dealer put it, while wrought material and cast scrap are in very little better condition. Quotations are without change, dealers' selling prices, gross tons, being as follows:

Old iron rails	$17 50 to 18 00
Old steel rails (mixed lengths)	14 50 to 15 00
Old steel rails (long lengths)	16 00 to 16 50
Relaying rails	28 50 to 30 00
Old wheels	17 50 to 18 00
Heavy melting steel	14 00 to 14 50
Mixed country steel	12 00 to 12 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$13 50 to 14 00
No. 2 R. R. wrought	12 00 to 12 50
Shafting	14 50 to 15 00
Dealers' forge, No. 1	12 00 to 12 50
No. 1 busheling and wrought pipe	11 00 to 11 25
No. 1 cast	14 00 to 14 50
Heavy cast (300 pounds and over)	10 00 to 10 50
Agricultural malleable	13 50 to 14 00
Iron axles	19 00 to 19 50
Steel axles	17 00 to 17 50
Cast borings	5 50 to 6 00
Mixed borings, etc.	5 50 to 6 00
Wrought turnings	10 50 to 11 00
Machine shop turnings	10 50 to 11 00
Iron axle turnings	10 75 to 11 25
Steel axle turnings	10 75 to 11 25
Stove plate and light cast scrap	10 00 to 10 50
Old iron splice bars	14 25 to 15 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, Sept. 8.

As an offset to some unfavorable indications industrially, the continued large business of the railroads is cited as an evidence that the prosperity of the country has not been affected to any alarming extent. Railroads still have all they can do to meet the demands for cars, and shippers often have difficulty in getting prompt transportation.

This is especially true of coke, which is moving slowly. Another evidence that the railroads have all the business they can handle is their refusal to make any concessions in freight rates to large shippers.

Iron Ore.—Instead of showing a large decrease for August, as compared with August of last year, the ore shipments show an increase of 25,900 tons. The totals were: 1902, 4,078,311 tons; 1903, 4,104,211. The shipments to Sept. 1 were:

	1902	1903
Escanaba	3,330,319	2,849,471
Gladstone	59,049	40,656
Duluth	3,608,930	3,766,030
Marquette	1,694,329	1,411,825
Ashland	2,290,239	1,950,659
Superior	2,508,289	2,684,737
Two Harbors	3,551,375	3,730,476
	17,051,530	16,429,854

The decrease for the season to date is 621,676 tons, or 3.65 percent, the ports showing a loss being: Escanaba, 481,048; Gladstone, 18,393; Marquette, 283,004; Ashland, 348,580. Superior, Duluth and Two Harbors made gains. Many vessels are having trouble in getting cargoes and it seems certain that unless the shipments of grain are larger than expected, a considerable tonnage will be tied up. So far this year, vessels have depended almost entirely on ore and coal.

Pig Iron.—The demand for spot iron is fair, with prices slightly lower. Southern Ohio is now selling at $14.50 to $15, Ironton, with $1.45 freight to Cleveland. Considerable malleable for delivery beginning in October and running through to March has been sold at $16.25 at Ohio furnaces. Southern iron sells usually on a basis of $11.75 for No. 2 foundry, Birmingham, but some furnaces have their product pretty well sold for several months ahead and are refusing to sell below $12. At the same time, there are reports of sales being made below $11.50. We quote Cleveland delivery, save in the case of gray forge, on which the quotation is at Valley furnace:

Bessemer	$16 85 to 17 35
No. 1 Strong Foundry	16 50 to 16 75
No. 2 Strong Foundry	15 75 to 16 25
No. 3 Foundry	15 25 to 15 50
Scotch No. 1	16 50 to 16 75
Scotch No. 2	15 75 to 16 25
Gray Forge, Valley furnace	14 25 to 14 50
Lake Superior charcoal	18 50 to 19 00

Finished Material.—The tone of the market seems to have improved slightly, but buyers are still waiting and the volume of business has not increased to any appreciable extent. It is becoming more evident that strikes and high prices of material other than iron and steel have checked building operations. The usual quotation of bar iron is 1.50c at the mill. The selling of steel at the price of iron has ceased and steel is now quiet but firm at the old prices, 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg. Sheets continue dull with cutting by independents still strongly in evidence. Recent concessions to jobbers by the principal producers have failed in their object of stimulating business. On sales made through jobbers, the prices for the principal products are unchanged as follows: Galvanized sheets, mill sales, carload lots, Nos. 10 and 11, 2.60c; Nos. 12 to 14, 2.70c; Nos. 18 to 21, 3c; Nos. 22 to 24, 3.20c; Nos. 25 and 26, 3.55c; No. 27, 3.80c; No. 28, 4.05c; No. 29, 4.45c; No. 30, 4.95c. Galvanized sheets out of stock are quoted 75 and 5 off. For 3-16-inch black sheets and heavier we quote 2.15c, Cleveland. Mill sales of black sheets to consumers are made on the following basis: No. 24, 2.65c to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c. The following are prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50c to 2.60c; No. 16, 2.60c to 2.70c; Nos. 18-20, 2.75c to 2.85c; Nos. 22-24, 2.85c to 2.95c; Nos. 25-26, 2.95c to 3.05c; No. 27, 3.05c to 3.15c; No. 28, 3.15c to 3.25c.

Old Material.—Nearly every week recently has brought a lower quotation on some kind of scrap, and this week is not an exception. We quote lower prices on railroad wrought, wrought turnings, malleable iron and heavy steel. There is, however, increased demand for machine cast and stove plate, on which prices are about 50 cents per ton higher. We quote, all gross tons, f. o. b. Cleveland:

Old iron rails	$19 00 to 20 00
Old steel rails (over 6 feet)	17 00 to 18 00
Old steel rails (6 feet and under)	17 00 to 18 00
Old car wheels	17 00 to 18 00
No. 1 R. R. wrought	15 50 to 16 00
Mill scrap	14 00 to 14 50
No. 1 machine cast scrap	14 50 to 15 00
Iron axles	22 00 to 23 00
Steel axles	22 00 to 23 00
Axle turnings	13 00 to 14 00
Wrought turnings (free from cast)	12 00 to 13 00
Cast borings	6 50 to 7 00
Uncut wrought iron boilers	9 00 to 10 00
Steel boiler plates	14 00 to 15 00
Grate bars	10 00 to 11 00
Pipes and flues (clean)	13 00 to 14 00
Tank iron	13 00 to 14 00
Hoop and band iron	10 00 to 12 00
Sheet iron	8 00 to 9 00
Wrought drillings	12 00 to 13 00
Malleable iron (railroad)	15 00 to 16 00
Malleable iron (agricultural)	13 00 to 14 00
Stove plate	11 00 to 11 50
Heavy steel	14 00 to 14 50

CINCINNATI.

Sept. 8.

The foundry coke market is easy in tone, with prices irregular. Well known brands are selling at $3 to $3.25 at ovens, while other foundry cokes are quoted at $2.75 and even $2.50 per ton at ovens.

Pig Iron.—Business of the week was somewhat interrupted by the holiday but there was a fair run of orders each day and the aggregate tonnage was about equal to the preceding week. The character of the buying has not changed and sales are still for small or moderate quantities, showing that consumers are still disposed to cover their immediate wants and are not ready to contract at present prices for their future requirement. There has been some inquiry for round lots with deliveries running into the last quarter of the year, in lots running from 500 to 1,500 tons, but these inquiries have not resulted in much business in forward buying. One of the large inquiries in the market last week resulted in a purchase of only 30 days requirements instead of the five months period inquired for, and the price was said to have been $14.90 for No. 3 foundry delivered at a point in Northeastern Ohio. The order was for 2,000 tons. The only other large sale reported was 2,300 tons of No. 2 soft, No. 3 and No. 4 foundry for September delivery at $11.50 Birmingham basis for No. 2. The bulk of the business now going is being taken at $11.50 Birmingham. The association furnaces are maintaining the $11.75 schedule and are able to get some small-lot quick shipment orders at this figure, but on any fair sized lots the minimum quotation obtains. The Southern Ohio furnaces have made no change in their prices the past week and $14.50 to $15 for No. 2 is still the market in the Ironton district. Some inquiry for Northern silvery iron is reported and better than $18 furnace is said to be quoted. Southern charcoal iron remains dull. In regard to the feeling of the trade, the belief prevails that melters will continue to buy from hand to mouth until they are more surely convinced that bottom prices have been reached. The following are the prices current, f. o. b. Cincinnati.

Southern Foundry No. 1	$15 25 to 15 75
Southern Foundry No. 2	14 75 to 15 25
Southern Foundry No. 3	14 50 to 14 75
Southern Foundry No. 4	14 00 to 14 50
Southern Foundry No. 1 soft	15 25 to 15 75
Southern Foundry No. 2 soft	14 75 to 15 25
Gray forge	13 25 to 13 50
Northern Foundry No. 1	16 15 to 16 65
Northern Foundry No. 2	15 65 to 16 15
Northern Silvery (8% silicon)	18 65 to 19 15
Southern car wheel iron	26 25 to 27 25

Finished Material.—The market shows no particular change, but the tone is easy. Prices for bar iron are very irregular and competition for any attractive business brings out low quotations. On good sized orders 1.60c base can be done. Steel bars remain at 1.73c base, half extras, with the retail price 2c base, half extras, for iron and steel out of store. Galvanized sheets are being quoted at 75 and 5 percent off. We quote black sheets No. 27 at 2.78c

in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.05c; No. 27, 2.95c; No. 16, 2.55c; No. 14, 2.45c; No. 12, 2.40c; No. 10, 2.30c. Tank plates are firm and sell out of store at 2.15c for ¼-inch and 2.25c for 3-16-inch. Beams and channels are quoted at 2.15c to 2.25c from stock, and angles at 2.15c and 2.25c for base sizes.

In merchant pipe there is no change in conditions and there is a good steady run of orders at unchanged prices. The tube market is strong with a good run of orders.

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	63.7	53.7
½ inch	68.7	58.7	65.7	55.7
¾ to 6 inch, inclusive	73.7	63.7	70.7	60.7
7 to 12-inch, inclusive	67.7	57.7	64.7	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	35.2
1¾ to 2½ inch	54.2	34.2
2¾ to 5 inch	59.7	44.2
6 to 12 inch	54.2	34.2

Old Material.—There is no change in prices and very little trading. We quote:

Old No. 1 railroad wrought, net tons	$14 00 to 15 00
Cast machine and foundry, net tons	12 00 to 12 50
Old iron rails, gross tons	19 00 to 20 00
Old steel rails, gross tons	17 00 to 18 00
Old short lengths, gross tons	14 50 to 15 50
Old iron axles, net tons	20 00 to 21 00
Stove plate, net tons	9 00 to 9 50
Wrought turnings, net tons	11 00 to 11 50
Cast borings, net tons	6 00 to 6 50

The anticipated reduction in freight rates from Southern furnaces was not granted by the railroads at their meeting on Sept. 4. The trade confidently expected that it would be made. The railroads, however, decided that at this time the conditions did not warrant the sacrifice of revenue. The trade say that it is only a question of time when the loss of business will make it plain to the railroads that the reduction is necessary and that it will then be made.

PHILADELPHIA.

Sept. 8.

General conditions, such as the prospect for good crops and the improvement of the money market, have caused a more hopeful feeling in iron and steel circles, but it is difficult to discover any real change for the better. The trade does not seem to respond to external conditions. Prices are slightly lower, mills are short of orders and business is dull.

Pig Iron.—Buying is on a larger scale, but this is due to contracts being closed and consumption being supplied by new purchases, so that sales do not mean increased requirements. Sellers are getting much less than they did on old contracts. Prices are easier, but there is a feeling that lower quotations will not be given for some time. For No. 2 X foundry $16.50 delivered would be accepted and $16 might be done on large orders. Some irons in small lots are selling at $17. We quote: No. 1 X foundry, $18 to $18.50; No. 2 X foundry, $16.25 to $17; No. 2 plain, $15.25 to $15.75;gray forge, $15 to $15.50; basic, $15.50 to $16.

Steel.—Business is dull, only hand to mouth lots being taken. Official quotations do not hold in face of the competition. From $28 to $28.50 delivered is quoted, but on large orders 25c to 50c better could probably be done.

Finished Material.—Decreased demand has resulted in restriction of output, even at mills which have not been idle for several years. Prospects are, however, a little better. Inquiries are numerous. We quote: Plates in small lots, 1.80c to 1.85c; carload lots, ¼-inch and thicker, 1.75c to 1.80c; flange, 2c; marine, 2.10c to 2.15c; firebox, 2.20c to 2.25c. On bars, prices for carloads are quoted at 1.60c to 1.65c for refined iron and 1.73½c to 1.75c for steel bars. Beams, angles and channels, ordinary sizes, are quoted 1.73½c to 1.80c for carload lots, with the usual addition for smaller quantities.

Old Material.—It is hard to give accurate quotations, as transactions are few. We quote: Old steel rails, $16.50 to $17; miscellaneous heavy steel scrap, $16.25 to $16.75; low phosphorus scrap, $24 to $25; old steel axles, $18 to $19; old iron axles, nominal, $20 to $21; old iron rails, nominal, $19 to $20; old car wheels, nominal, $19 to $20; choice scrap R. R. No. 1 wrought, $16.50 to $17.50; country scrap, $14 to $15; machinery cast, $15 to $16; No. 2 light scrap, forge, $15 to $16; No. 2 light scrap, ordinary, $11 to $12; wrought turnings, $11.75 to $12.25; wrought turnings, choice heavy, $12.50 to $13; cast borings, $7.50 to $8.25; stove plate, $11.50 to $12.

BIRMINGHAM, ALA.

Sept. 8.

The present week of the iron market opens with rumors of a further reduction in price. In the meantime, a number of good sales for prompt and nearby delivery are being made from day to day. Old contracts have been practically completed and buyers of Southern iron are covering only their current needs, evidently hoping for a still further reduction. Some furnaces are reported to have advocated a differential of 50c to $1 per ton in favor of Eastern markets, covering the New England States, most of Pennsylvania, New York, Delaware, New Jersey, Maryland and Virginia, but it is not generally believed here that the furnaces of this district will favor the territory mentioned, but on the contrary that the $11.75 basis on ordinary business will be adhered to in all directions. Southern furnaces had hoped to secure a 50-cent reduction in freights to Northern gateways, but in this they were disappointed, the Southern roads refusing to again establish the old rate of $2.50 per ton to the Ohio river when iron sells at $12 per ton or less.

The receivers of the Southern Car & Foundry Co. are planning to start the Gadsden and Memphis works in a few days, with a view of working up the material on hand. No statement has as yet been published as to the financial condition of the company, but it is not expected that a very large dividend will be paid the unsecured creditors.

CHICAGO METAL MARKET.

OFFICE OF *The Iron Trade Review*, 1115 MONADNOCK BLOCK Sept 8.

Generally speaking, metals are dull and depressed, buyers covering only for immediate requirements. We quote Lake copper, carloads, 13¼c to 13⅝c; casting, 13¼c to 13⅜c. Pig tin, 28½c. Pig lead, 4.20c in 50 to 100-ton lots, and 4¾c to 5c in small quantities; spelter, 5½c in carload lots, and 6c to 6¼c in lesser quantities; sheet zinc, 6¼c; antimony, 10¾c to 11c for Cookson's, and 9¾c for Hallett's. We quote old metals as follows: Copper wire, 11⅛c; heavy copper, 11⅛c; light copper, 10¼c; heavy red brass, 11¼c; light brass, 10¼c; red turnings, 9¼c; yellow turnings, 7¼c.

American Can Co. Dividend.

At a recent meeting of the directors of the American Can Co., a dividend of 2½ percent was declared on the preferred stock, payable Sept. 30. This is the first dividend ever declared by the company, which was formed over two years ago, and calls for an expenditure of about $1,000,000. An official of the company made the following statement: "The sales for the first five months of the fiscal year increased more than $1,500,000 over the same period last year. The increased earnings are due largely to the concentration and improvement in plants and machinery which have taken place during the past eighteen months. These changes have enabled the company to produce goods of a better and more uniform quality and at lower cost. The company has ample working capital and discounts all its bills." The company was incorporated in New Jersey on March 19, 1901. The preferred stock is entitled to 7 percent cumulative dividends per annum. Of this stock ther is outstanding $41,233,300, so that the back dividends amount to 14 percent, or about $5,800,000. There is an equal amount of common stock outstanding, making the total issue of stock $82,466,600. The report for the year ended March 31 last showed net earnings from operations of $886,711.

THE FOUNDRYMEN'S ASSOCIATION.

The 130th meeting of the Foundrymen's Association was held at the Manufacturers' Club, in Philadelphia, on Wednesday evening, Sept. 2, with a fair attendance, including the following persons:

Dr. E. E. Brown, E. E. Brown & Co.
W. J. Burns, Wm. Wharton, Jr., & Co.
Dr. Funke.
W. J. Boyd.
M. H. Bickley, Penn Steel Casting & Machine Co., Chester, Pa.
J. N. Ebert.
Fred. H. Bateman, Bateman Mfg. Co., Grenloch, N. J.
W. O. Steel, Bateman Mfg. Co., Grenloch, N. J.
W. L. Taylor, Tioga Foundry Co.
W. J. Shennen, Bethlehem Steel Co., South Bethlehem, Pa.
Geo. W. Johnston, Ernst Law & Co.
M. H. Benkert, Williamson Bros. Co.
M. H. Baskin.
A. Levy, C. H. Gifford & Co.
W. A. Perrine, Abram Cox Stove Co.
T. J. Kelly, Abram Cox Stove Co.
J. Parker Jefferis, Pusey & Jones Co., Wilmington, Del.
G. A. Messick, Pusey & Jones Co., Wilmington, Del.
P. D. Wanner, Reading Foundry Co., Reading, Pa.
T. B. Harkins, Harkins Foundry Co., Bristol, Pa.
A. E. Outerbridge, Jr., Wm. Sellers & Co.
L. B. Bankson, Naval Constructor U. S. Navy Yard.
H. O. Evans, Thos. Devlin Mfg. Co.
R. C. Oliphant, Oliphant Steel & Iron Co., Trenton, N. J.
H. L. Haldeman, Pulaski Iron Co.
Geo. C. Davis, Chemist.
J. Hy. Pepper, *The Iron Trade Review.*
W. H. Ridgway, Craig Ridgway & Son Co., Coatesville, Pa.
F. C. Price, E. J. Etting.
J. S. Hibbs, J. W. Paxson Co.
J. Thompson, J. Thompson & Co.
A. A. Miller, *Iron Age.*
F. M. Etting, E. J. Etting & Co.
W. P. Cunningham, A. & P. Roberts Co., Pencoyd, Pa.
Arthur Simonson, Wm. Wharton, Jr., & Co.
Michael A. Magee, U. S. Navy Yard.
H. L. Tripnel, Standard Scale Works.
Howard Evans, J. W. Paxson Co.

In the absence of Thos. Devlin, the president, the chair was taken by Dr. E. E. Brown, of E. E. Brown & Co., sash weight manufacturers.

The treasurer, Josiah Thompson, reported the treasury to be in a good condition, $2,114.41 being the balance on hand, with all bills paid.

The committee on arrangements for an exhibit of modern foundry equipment in service at the St. Louis Exposition reported progress. Considerable headway in the project had been made, and applications from manufacturers anxious to contribute to the exhibit were numerous, thus insuring the success of the plans as already outlined.

The paper of the evening was by Arthur Simonson, of Philadelphia, on "The Small Converter Process for Making Steel Castings." The process treated was the Tropenas method, which has been fully described in these columns. A short discussion followed.

Mr. Ridgway: I must congratulate Mr. Simonson on his paper. It is the best I have heard read before the association for a long time, both for clearness and explanation. I would like to ask whether he knows why a Tropenas plant installed at Phœnixville, Pa., was abandoned. We used to get from this concern the best castings we got anywhere. They are now making gray iron castings, and have abandoned steel castings.

Mr. Simonson: I was there previous to their shutting down, and I found they were running the plant in a lax manner and making consequent losses. They were also under disadvantages in regard to the handling of freight. It would also seem that they were trying to sell castings for a lower price than they could produce them.

Mr. Hibbs: What kind of pig iron would you use?

Mr. Simonson: Low phosphorus iron. Low phosphorus Bessemer is good.

Mr. Outerbridge: Did you use any aluminum in the process? I should think you did—although nothing is said on this point in the paper—especially for castings for electrical purposes.

Mr. Simonson: Yes. It is simply added as a precaution. I have cast hundreds of tons for machinery and other higher carbon steels. In dynamo steel it is necessary to add a little more than to steel for other purposes, to make assurance doubly sure. In the case of ordinary machinery steel not more than 3 to 4 ounces to the ton is necessary—in dynamo steel 3 or 4 times as much is used.

Mr. Outerbridge: Is the use of aluminum free from any patent royalties?

Mr. Simonson: As far as I know, it is. I have used it 10 or 12 years. I think it is used in every plant where the Tropenas process is employed.

Mr. Hibbs: I noticed in your table that in the five minutes' blow your silica increased in the slag. Where did it come from?

Mr. Simonson: From the increased heat in the converter, and the silica burned out of the iron.

Mr. Outerbridge: Do you find that the skimmer keeps all the slag out of your metal when pouring into small ladles?

Mr. Simonson: Not all of it, but you find no more than is found in an ordinary iron ladle.

Mr. Outerbridge: How long can you keep that steel in a small hand ladle before you pour it?

Mr. Simonson: No longer than we can help. Sometimes it stays 2 to 3 minutes and is quite hot. It cannot stand as long as cast iron.

A short discussion then took place on the labor question, during which Mr. Bickley, of the Penn Steel Casting & Machine Co., repeated the story of the recent strike at the works of his company.

After the meeting a lunch was served in the roof garden of the club.

Implement Manufacturers' Convention.

The National Association of Agricultural Implement and Vehicle Manufacturers will hold its annual convention at the Hollenden Hotel, Cleveland, Oct. 21, 22 and 23. This association has as members most of the prominent implement and vehicle manufacturers in the country, and through its standing committees has made its influence felt in respect to transportation, national and state legislation, patents, dealers' associations, and lands and irrigation and foreign commerce. A. G. Huckin, of the Plano division, International Harvester Co., is chairman of the committee on passenger transportation; James Deering, International Harvester Co., of the committee on national legislation; W. W. Collier, American Harrow Co., Detroit, of the committee on State legislation; P. A. Myers, F. E. Myers & Bro., Ashland, O., of the committee of patents, and H. M. Kinney, Winona Wagon Co., Winona, Minn., of the committee on foreign commerce.

The association represents in its membership a capital actually engaged in manufacturing, of $300,000,000, an annual product of $400,000,000, and 150,000 employes. The tonnage of freight received and shipped annually is estimated at 8,000,000. Martin Kingman, Peoria, Ill., is president; R. H. Foos, Springfield, O., treasurer; and Frank E. Lukens, Chicago, secretary. The vice presidents are: O. W. Johnson, Racine, Wis.; H. C. Stahl, Bellevue, O.; B. T. Skinner, Battle Creek, Mich.; C. S. Witwer, Joliet, Ill.; W. A. Dromgold, York, Pa.; W. H. Ritchie, Minneapolis, Minn.; M. H. Timberlake, Lafayette, Ind.; C. E. Whitman, St. Louis, Mo.; Nath'l French, Davenport, Ia.; C. A. Chase, Syracuse, N. Y.; J. A. Rockwell, Harriman, Tenn. The Cleveland committee of arrangements is making extensive preparations for the convention. Chas. E. Adams, general manager of the Cleveland Hardware Co., is chairman of the committee, and J. R. Mills, Jr., local manager of sales for the Carnegie Steel Co., is secretary.

Horace W. Reisinger, Henry B. Prather and A. Gross MacConnell, of Pittsburg, announce the organization of the Reisinger-Prather Co., Fidelity Bldg., Pittsburg, engineers and contractors for steam engines for mill and electric service, mechanical stokers, fans and fan system steam heaters for heating, ventilating and air moving purposes, and for complete steam and electric power plants for electric railway, lighting and power service.

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THE BLAST FURNACE PROBLEM.

A declining iron market brings problems that give the producer much to think about. One year ago, and all through 1902, the iron trade was suffering from the pains of prosperity—from the breaking down of the whole transportation structure under the weight of a tonnage with which all the car and engine building and the terminal building of three preceding years could not cope. Producers of pig iron were making money, but they were not doing business as they wanted to do it. Their customers were weary of the struggle to get what they had bought, and the frictions and failures of their attempts to connect with the melting furnaces of the country made many a producer long for the day when the supply would again be greater than the demand. The wish has been satisfied, but new troubles have come with the change, and even the contemplation of his more than four years of handsome profits does not make the furnaceman happy. Some of the things he is thinking about are put on record in another column, by the same producer of pig iron whose comment on the situation at the height of the boom of 1899 appeared in *The Iron Trade Review* of Nov. 9, 1899.

The iron market in the United States is capable of so many changes in four years, that one who has had any experience with it is not apt to dogmatize in discussing its prospects. Our correspondent observes truly that freight reductions and wage reductions are no remedies for falling pig iron prices, and intimates that there is a good deal of comment in trade journals and out of them, when conditions change markedly, that does not contribute to a solution of the furnacemen's problem. But it is to be remembered that most of the things that producers complain of when flood-tide prosperity shades into a time of lower prices and closer margins, are inseparable from competition. Wage reductions, which reduce the purchasing power of those immediately affected, only extend the circle influenced by the decline, it is true, yet it is to be considered that such reductions are not necessarily the result of a decree of the employer. He might well choose to hold what prosperity has brought him, and close down when the market crosses the line of fair profit. But his employes are to be considered. Idleness is not a welcome prospect to them. Often it has happened that they offer to accept lower wages rather than be idle all or part of the time. Other considerations, purely local, lead the employer to continue even when profit is wiped out. He goes into the market and sells below any price so far recorded, with the thought that the large order thus obtained will keep his plant running, his organization intact, and save his men from the hardships of idleness. Another furnaceman in another district repeats the operation—possibly from an advantage in location or in cheap raw materials, or in better equipment, he can even deepen the cut and come out even. Meanwhile if falling consumption increases the gap between production and consumption, the individual initiative of scores of furnacemen competing sharply for the business offered, brings in a train of wage reductions, freight reductions, raw material reductions and all the familiar accompaniments of a period of settling prices.

To say that many of the things pig iron producers have done in the checkered history of the iron industry were foolish, is but saying that many features of the competitive regime in industry are foolish, demoralizing and indefensible. But competition is with us. In the pig iron industry it is very real. It was because pig iron production was more completely competitive than any other part of the business that we had the excessive prices of last year. Apart from the organization of the Bessemer furnaces of the Mahoning and Shenango Valleys, and the temporary attempt of the large Southern producers to maintain a $12 basis early last year, there were no controlling or regulative forces at work; so at the present time, as in the reaction of 1900, there is no organized agency that can save the furnace interest at large from the follies that accompany a decline.

It is with transportation as with wages. Many a time the iron manufacturer's insistence upon wage reductions has been met with the response from the union that the reduction would only be given away to the buyer, leaving the wage-earner no better off than before. On somewhat the same ground, no doubt, the railroads based their refusal last week to reduce the rate on Southern pig iron to the Ohio river. In all such cases section answers section. The Southern furnacemen want lower freights now to meet the prices Northern furnacemen have been quoting. The moment the request is granted, Northern furnacemen will turn to their railroads for lower rates on ore and coke.

This line of reasoning and that adopted by our correspondent might suggest that high freights and high wages once established must not be changed. That position, plainly enough, is not tenable. The problem is exceedingly complex and safe ground is not easy to find. The right adjustment of supply and demand is what the market is constantly seeking—an operation full of difficulty, losses, hardship and dislocation. Last year presented one set of hardships; the future of the pig iron market may repeat in a familiar way another set. It is but little more than five years ago that the National Association of non-Bessemer Pig Iron Manufacturers was formed at a meeting in New York City, to try to work out some relief from the desperate condition in which the foundry iron furnacemen found themselves. There seemed no hope for profitable operation except through regulation. Hard work was

done by some of the brightest minds in the trade, in the formulation of curative and regulative measures. Only a few months passed before signs of a revival appeared and within one year from the organization of the association, which by the way never became practically operative, its members were making prices and profits beyond their most extravagant dreams. It was in April of the same year, 1898, that the producers of Bessemer iron, discouraged over the outlook and weary of the profitless months of $9.75 and $10 Bessemer at the furnace, decided that every merchant furnace in the two Valleys should bank for 30 days out of the ensuing three months. That the experiences of these same furnacemen in the past four years have been far from desperate is well enough indicated by the market range from $16 to $22 for their product.

Whether such serious considerations as come to the average furnaceman in times like the present will lead to any better solution of his problem than the past has furnished is much to be questioned. The merchant furnaceman's passing has so long been imminent that he has become well used to a more or less precarious existence. What seems most likely to happen is the extension of what has already come into the trade—the grounding of independent furnace interests in ore and coke supplies, either through long contracts or by direct ownership. Already the strong interests producing foundry iron, both North and South, are thus fortified against the fluctuations that in former years made furnace operation so disastrous, and scarcely a new furnace has gone up in the past two years or is now building, that is not so situated in respect to raw materials as to make it essentially an integrated concern. Thus in time the merchant furnace, as it was once known and is still, to a more limited extent, will indeed pass into history in the way that has long been threatened. Such a consummation will undoubtedly bring a solution of some of the problems which our correspondent "Furnaceman" finds of such great present concern.

MODERN RACING MACHINES.

The international contest of the yacht racing experts has for this year passed into history and the man who seems fated to lose has again borne with great good humor his ill fortune. Whatever he might be as a winner he is an undeniable success as a loser and his philosophic grit and vim have been conspicuous features of his visits to these shores. The contest itself is becoming each year more than ever a mechanical engineering problem. The yachts themselves bear more resemblance to machines than of old and the task of the shipyard less the work of the carpenter than of the metal worker. In this respect the designers of the most advanced types of racing yachts have carried to a higher stage the methods adopted in trans-Atlantic steamers, the freighters of the Lakes, and other vessels where metal skin and frames accompany the high pressure units of propulsion. The passing of oak, pine and cedar for steel and bronze is as natural an evolution as from the simple engine to the triple and the quadruple expansion machines with their corresponding increase in pressures.

The problem of the racing yacht, similarly, is that of the combination of high power with a minimum displacement. A further element entering into the construction of these racing machines is their excessive lightness. Here is a strong resemblance to the development of the racing bicycle. Each started from a heavy frame and this was gradually carved until the members were marvels of graceful proportions and minimum weight. The development of high grade steel tubing and wire in its varied forms, the perfection of the ball bearing, the establishment of the chain and sprocket as economical gearing of high utility, may be credited very largely to the increasing demands of bicycle riders. The racing bicycle, like the racing yacht, was the acme of these requirements. There an excess of weight meant every item over the amount required to hold the parts in place. The machine was not to wear out but to endure for a brief season of stress while the engineers strengthened the old design in one or more details and then on the new basis of endurance cut down the general weight to a still lower figure.

This seems to have been the practice of the yacht designer in his adoption and treatment of the metal constituents of the racing contestants. The increased displacement has been followed by a still greater increase in the sail area; the discarding of wood for metal and hemp for steel enables the designer to cut away weight and retain sufficient strength and elasticity to stand the stress and strain of the seas. The designer of the cup defender is not only well known as an expert in naval architecture and a practical yachtsman, but is a mechanical engineer of prominence. His work on the torpedo fleet demanded great skill and he has deserved the success earned by the building of these speedy additions to the navy. He is also an inventor of ability. The water tube boiler of his design had same very novel characteristics and for the special purpose for which it was intended was most successful. Years ago he spent some time on the subject of a practical steam-propelled automobile, but the increasing demands upon him forced other work more prominently to the front. He was associated with the early work of George H. Corliss, the Providence inventor and builder of the engine now well known by his name, and thus his career as a mechanical engineer has been continuous and successful. Undoubtedly the foundation thus laid has been of the greatest utility in the scientific development of the modern racing yacht.

The yacht building establishment at Bristol, R. I., does not follow the practice of the "open door." The imaginative reporter is thrown wholly upon his own resources in the search for facts during the planning and erection of a cup defender. The greatest secrecy prevails and every effort to maintain this condition is put forth. The designer has made so great a success of his work that it does seem unfortunate that for the general good he has had so little to say in regard to his task, considered either as a whole or in detail. The towering spars and canvas suggest an extensive knowledge of wind pressures and somewhere a store of practical data which would amplify the experiments of Baker to general advantage. In fact the problems arising in modern yacht building are pertinent to the refinements of both bridge and sky scraper construction. The corrosion of metals, the elasticity and strength of structural shapes particularly in combination with plates, the attachment and adjustment of wire cable, the design of steel columns and the application of braces to resist transverse stress as in the case of the hollow mast loaded with nearly a third of an acre of wind resisting canvas—these and many other matters might be elucidated to the benefit of the engineering world. But these questions are not likely to receive answers from the reticent designer of the Reliance, and the latest example of his genius, after the pattern set by the one horse shay, will soon be on the brink of general dissolution. The end sought has been attained and this is the crucial test.

LAKE SUPERIOR IRON MINES.

Operation of power drills has begun in the ledge at the Cleveland-Cliffs Iron Co.'s Maas mine, Negaunee. The drills are now down 20 feet in the ledge. At the point where the ledge was cut it stood nearly vertical and the greatest difficulty was encountered in getting the shaft safely bottomed. This company is developing a body of silicious ore in its old Ogden property at Ishpeming.

Final payment of the $1,500,000 bonus has been made to the fee owners of the Negaunee mine by the Cleveland-Cliffs Iron Co. and on Sept. 3 the property passed into the hands of that company. The Negaunee has an interesting history. Twenty years ago a lease was made by Mitchell, Maas & Lonstorf, to the Cleveland Rolling Mill Co., at a royalty of 25 cents a ton. Five years ago this company sold this lease for a bonus of $650,000 to the American Steel & Wire Co. Before the organization of the United States Steel Corporation, the property was in bad shape, and many thousands of dollars were spent for repairs. On Jan. 7, 1902, the mine caved in, a number of men were buried and the old shaft was ruined. The second shaft was then under way, and the property was quickly put into condition, and has since been a large producer. The Oliver Iron Mining Co. operated the property until a year ago, when a lease was given on a basis of a bonus of $1,500,000, and a 30 cent royalty to the Cleveland-Cliffs Iron Co.

The Ashland mine at Ironwood, which at one time was abandoned in the belief that the ore deposits had been exhausted, will ship this season nearly 400,000 tons. The property is owned and operated by the Cleveland-Cliffs Iron Co.

Notice has been sent by the Oliver Iron Mining Co. to nearly all land owners of properties upon which it has options for exploration that it will shortly discontinue work and abandon the options. This is so general on the Mesabi range that it is not expected, in the course of 45 to 60 days, the company will have drills on more than two or three tracts there. The company is concentrating drills on the few lands it proposes to continue work on till the closing of its options, and will concentrate still further shortly. It is not understood that this action is taken with any general view of curtailing expenses or in other way reflecting on present conditions, but on account of a settled change in policy as to the method of securing ore lands, and that in future it will be more likely to buy lands that have been explored and developed by others, than to carry on extensive work on its own account. Practically the same move have been made on the Menominee range, where the company has been carrying on much exploration for a long time, and where success has not been remarkable. This action may possibly modify the views of holders of ore lands, who have been rather stiff in their ideas the past few months, and for that reason it is welcomed by many others who are in the exploring business on the several ranges of Lake Superior.

J. H. Quinn, of Ishpeming, who has secured an option on the American mine on the North range west at Ishpeming, is receiving inquiries concerning it, and it is probable that the work of reopening the shafts will soon be commenced. Mr. Quinn has not disposed of the property, but expects to do so. The ore is of high grade, and when the mine was operated, demanded high prices. The ore has run from 64 to 68 percent iron, 4.70 silica and .04 phosphorus.

George J. Lonstorf, Milwaukee, has an option for the lease of the celebrated iron ore property on the Southern Mesabi range known as section 30. The Clergues recently abandoned their option after spending about $35,000 in explorations.

While clearing a swamp for a hay meadow, Thomas J. Walsh, of Tower, Vermillion range, made what he believes to be an important discovery of iron ore. There were only three inches of moss over the outcrop. He employed men to strip the surface, and says there is a well-defined ore body.

Capt. M. L. Fay has returned from Birmingham, Ala., where he closed a deal, whereby W. H. Yawkey, of Detroit, and himself acquire a controlling interest in the fee of 15,000 acres of ore lands and 30,000 acres of coal lands in the Birmingham district, within a radius of thirty miles of that city. The ore lands are in the Red Mountain district.

The Scott Iron Mining Co., recently incorporated by Menominee capitalists, proposes to mine and smelt iron ore on lands in Delta andMarquette counties, Mich.

A contract for stripping the Fayal mine, Mesabi range, has been let to Drake & Stratton, and over 2,000,000 yards of dirt will be removed, and four or five hundred men will be employed. The contract let is that of stripping the large dump southwest of No. 1 shaft.

A find of iron ore is reported on the Mesabi range east of Biwabik on lands owned by the Longyear Mesabi Land Co., of which J. M. Longyear is the head. The new find is south of the Miller mine. The limits of the ore deposit have not been established, but the two drills at work are said to show a large body. The new find is interesting in that it is far south of the ore formation as indicated on the old geological maps. The find was made by Eaton Bros., of Duluth, and a number of Mesabi range men. They also discovered the Miller mine, which was recently leased by the La Belle Iron Co., of Steubenville, O.

Personal.

Albert Ladd Colby, for the past ten years metallurgical engineer of the Bethlehem Steel Co., has accepted the position of assistant to the president of the Orford Copper Co., 74 Broadway, New York, one of the constituent companies of the International Nickel Co., which controls the nickel output in the United States. Mr. Colby's duties will be chiefly in connection with the manufacture and applications of nickel steel.

J. G. Miller, until recently connected with the Philadelphia, Pa., office of Rogers, Brown & Co., has been appointed Philadelphia manager for Howard M. Hooker & Co. of Pittsburg, dealers in pig iron and coke, with offices at 1014 Pennsylvania Building.

John Stevenson, Jr., the organizer of the Sharon Steel Co. of Sharon, Pa., will sail from Europe with his family for New York about the middle of the present month. He left for Europe shortly after the absorption of his company by the United States Steel Corporation.

Thomas M. Morrison, who recently resigned as superintendent of the Edgar Thomson plant of the Carnegie Steel Co., has been elected one of the directors of the Diamond National Bank, Pittsburg.

Three directors of the Chicago Pneumatic Tool Co., W. J. Chalmers, John A. Lynch and C. H. Wacker, have tendered their resignations. The reason they give is that as the company's headquarters is to be moved to New York, they will be unable hereafter to attend the directors' meetings.

The Reading Iron Co. has created the office of assistant to the president, George F. Baer, and David Thomas has been appointed to that position. Mr. Thomas was for many years superintendent of the Montour Rolling Mills.

Trade Publications.

A fine engraving of the southern portion of Manhattan is being sent out with the compliments of P. & F. Corbin of New Britain, Conn. The picture shows the famous sky line of New York when approached from Jersey City, and the towering sky-scrapers are prominent features of the view. Many of these buildings are enumerated as users of Corbin hardware.

"Peter Cooper" is the subject of the short story told this month by Wyman & Gordon, drop forging manufacturers of Worcester, Mass. The booklet is fully as entertaining as any of its predecessors, and a good half-tone is given of the well-known philanthropist.

The Keystone Driller Co. of Beaver Falls, Pa., has in Catalogue No. 1 some account of the latest improved drilling machinery for mines, wells, etc. The book contains 88 9x12 pages, and has a general discussion of the practice of drilling with numerous illustrations. Catalogues Nos. 2 and 3, from the same company, relate to mineral prospecting machines and to portable and traction oil well rigs respectively.

A petition in involuntary bankruptcy has been filed in the United States court, Utica, N. Y., against the I. A. Weston Co. The Weston Co. was incorporated several years ago, and has been engaged in the manufacture of bicycle supplies.

IRON AND STEEL INSTITUTE VISIT IN 1904.

The Iron and Steel Institute closed its autumn meeting at Barrow-in-Furness, Eng., Sept. 3. It unanimously accepted an invitation extended by Charles Kirchhoff of New York, representing American engineering and steel manufacturing interests, to hold a meeting in 1904 in the United States. Andrew Carnegie, president of the institute, said he regarded the acceptance of the invitation as an international event pregnant with beneficial results. The meeting in the United States will be held in the autumn of 1904. The next meeting of the institute will be held in London, in May, 1904.

There is a special appropriateness in an American meeting of the Iron and Steel Institute in 1904, since Andrew Carnegie's presidency will continue through that year. It was Mr. Carnegie who welcomed the Iron and Steel Institute to the United States in 1890, when its sessions were held at Chickering Hall, New York, beginning on Oct. 1 and continuing through the two days following. This session was preceded by the meeting of the American Institute of Mining Engineers in the same hall on Sept. 29 and 30, in which the British guests, including Sir I. Lowthian Bell and Sir James Kitson, participated. Among the papers at the joint meeting were those of H. H. Campbell, on "Economies in Steel Making;" S. T. Wellman, on "Machinery for the Charging of Heating and Melting Furnaces;" James Gayley, on "The Development of American Blast Furnaces, with Special Reference to Large Yields;" R. A. Hadfield, on "Aluminum Steel;" Sir Henry Bessemer, on "The Bessemer Process;" Prof. Elihu Thomson, on "Electric Welding;" Dr. C. B. Dudley, on "Wear of Metal as Influenced by Its Chemical and Physical Properties;" Sir I. Lowthian Bell, on "The Probable Future of the Manufacture of Iron;" Dr. Wedding, on "Progress of German Practice in the Metallurgy of Iron and Steel since 1876, with Special Reference to the Basic Process." A feature of the meeting was the address of Abram S. Hewitt, in which he predicted that the world would require 35,000,000 gross tons of pig iron in 1900, "of which the United States will furnish 45 percent and the other iron producing countries the remainder in the proportion of one-half to Great Britain and one-half to Germany, France, Belgium and the other smaller producers."

The tour of the iron and steel producing districts of the country, following the New York meeting, was a memorable one. In the month that elapsed between the technical sessions and the farewell banquet, which was also held in New York, thousands of miles were covered in special trains carrying over 500 guests and entertainers. From New York the visitors went to Philadelphia, thence to the Cornwall ore banks, the Altoona shops of the Pennsylvania Railroad, to Pittsburg, Buffalo, Chicago, and the Lake Superior region, while a section was taken South to visit the Birmingham district.

The changes that have come over the American iron trade meanwhile are of the most revolutionary sort, both as to manufacture and organization. In the interval representatives of the British Iron Trade Association have visited the Columbian Exposition and reported on the industrial development there exemplified, and other representatives of the same association constituting a special commission came over in 1901 to report upon later progress in steel manufacture and upon the effect of the combines and other economic changes upon the competing power of American steel in the world's markets. The reports of this commission and the agitation in Great Britain for a change in fiscal policy have no doubt had something to do with the ready acceptance of the invitation for an American trip of the Iron and Steel Institute in 1904, albeit that body is devoted entirely to technical and eschews political and fiscal questions.

The Master Steam Boiler Makers' Association will hold its second annual convention in the Palmer House, Chicago, Oct. 7, 8, 9 and 10, and it is expected to bring together the largest number of boiler shop superintendents, foremen, assistants and layers-out ever gathered in convention.

The butt weld, socket and machine shops of A. M. Beyers & Co., Seventh and Bingham Sts., South Side, Pittsburg, were destroyed by fire last week, entailing a loss of $50,000. The departments will be rebuilt immediately.

COAL MERGER IN THE PITTSBURG DISTRICT.

At a meeting of the board of directors of the Pittsburg Coal Co., held at Pittsburg, Pa., Monday, Sept. 7, it was decided to purchase a majority of the stock of the Monongahela River Consolidated Coal & Coke Co. For the present the latter concern will not lose its individuality, but it is probable that after the annual meeting of the company, to be held in November, it will be merged in the Pittsburg Coal Co. The Monongahela River Consolidated Coal & Coke Co. is capitalized at $40,000,000, divided into $20,000,000 common stock, $10,000,000 preferred stock and $10,000,000 bonds. The amount of the latter now outstanding is about $9,350,000, the reduction having been made by the retirement of bonds out of the sinking fund. Its total resources, according to the last annual report, slightly exceeded $45,000,000.

The company ranks next in size to the Pittsburg Coal Co. in the production of coal in this district. The output of its mines last year approximated 8,000,000 tons, and for the current fiscal period will reach 9,000,000 tons. The company has been paying 7 percent dividends each year since its organization on its preferred stock, but none has ever been paid on the common. The officers are: J. B. Finley, president; George W. Theis, vice president and secretary; George I. Whitney, treasurer. The directors are: J. B. Finley, George I. Whitney, H. C. Fownes, S. S. Brown, George W. Theis, Hugh Moren, A. Jutte, John A. Wood and R. H. Boggs.

The output of the Pittsburg Coal Co. last year approximated 15,000,000 tons, or 62 percent of the total coal mined in what is known as the Pittsburg district. This year the output will be increased. Taking the 9,000,000 tons produced by the River Coal Co., the combined tonnage will be very close to 25,000,000. This is about one-fourth the total output of bituminous coal in Pennsylvania last year.

The capitalization of the Pittsburg Coal Co. consists of $32,000,000 common stock, $32,000,000 preferred stock, and $6,000,000 debenture bonds. Its acreage, plant and equipment are valued at $77,000,000, and its total assets at $87,000,000. Adding the $45,000,00 assets of the River Coal Co., the combination of interests represents a total of $132,000,000.

Pittsburg Foundrymen's Association.

The first regular monthly meeting of the Pittsburg Foundrymen's Association for the season 1903-1904, was held at the rooms of the Engineers' Society of Western Pennsylvania on Monday evening, Sept. 7. Charles G. Smith, of the Charles G. Smith Co., dealers in machinery, Pittsburg, read a paper on "Emery Wheel Practice in Foundries," which was well received. Despite the legal holiday the meeting was fairly well attended. A nominating committee was appointed consisting of Messrs. John McLaren, E. D. Frohman and A. O. Backert, to present names for the election of officers to be held at the October meeting.

The firm of Howard W. White & Co., Old Colony Building, Chicago, has been organized to transact a jobbing business in iron and steel products and act as special representatives of manufacturers of heavy machinery. Mr. White, the manager, has had a wide experience in the sale of iron and steel and machinery, having been associated with leading manufacturers and jobbers of these products for a number of years. The company will make a specialty of high grade sheets and cold rolled strips for stamping, etc., although it will handle a full line of other metal products; and for the purpose of facilitating prompt shipment has direct communication with several of the mills which it represents. Punches and shears, pneumatic tools, air compressors and hydraulic machinery, comprise its specialties in the machinery line. Plans are being drawn for the construction of a warehouse at a central point from which prompt shipments of material can be made. The company has also in press a catalogue containing a full line of the products it will handle. This will be mailed on request. It will contain a number of special features.

The Central Iron & Coal Co., operating the new blast furnace at Holton, Ga., has purchased ore lands at Giles, on the Alabama Great Southern Railroad, and has put up a large washer and made other improvements.

THE FALL IN PRICES SINCE JANUARY 1.

In the current issue of the *Bulletin* of the American Iron and Steel Association the following table appears, giving the average monthly prices of seven leading articles of iron and steel at Philadelphia and Pittsburg from Jan. 1, 1903, to Sept. 1. The prices named are per ton of 2,240 pounds, except for bar iron, which is quoted by the 100 pounds. At Philadelphia prices of bar iron are quoted from store, but at Pittsburg from mill. Prices of No. 1 foundry pig iron at Philadelphia are preserved for comparison with former years, this grade of pig iron having been the standard grade from 1842 until this time.

Months	Old iron T rails, at Phila.	No. 1 foundry pig iron, at Phila.	Gray forge pig iron, at Phila.	Gray forge pig iron, at Pittsburgh	Bessemer pig iron, at Pittsburgh	Steel rails, at mills, in Penna.	Steel billets, at mills, at Pittsburgh	Best refined bar iron, at Phila.	Best refined bar iron, at Pittsburgh
January	$23.50	$24.00	$20.50	$20.50	$22.85	$28.00	$29.60	$2.30	$2.00
February	23.75	23.75	20.00	20.50	21.91	28.00	30.00	2.30	2.00
March	24.50	23.50	19.50	20.87	21.85	28.00	30.62	2.30	2.00
April	24.90	22.70	19.10	20.45	21.28	28.00	30.20	2.30	2.00
May	24.50	21.37	18.62	19.87	20.01	28.00	30.25	2.16	2.00
June	23.50	20.62	18.00	18.87	19.72	28.00	28.87	2.12	1.77
July	22.00	19.00	17.50	17.90	18.93	28.00	27.40	2.01	1.70
August	19.37	18.00	15.81	16.04	18.35	28.00	27.00	1.93	1.70

The "Cire Perdu" Process of Molding.

The original *Cire perdu* (lost wax) process of molding is as follows: A loam core is first prepared, the shape and size of the hollow in the intended casting. This is then coated with wax to the thickness that the metal is wanted; this wax is now molded to the exterior form of the intended casting (which is usually a bust or small statue). Some wires are now pushed through the wax into the core. This model is now placed in an iron molding box of sufficient size to take it conveniently, and strong molding sand carefully rammed around it. Provision is made during the ramming for the exit of the wax, which channel also serves for the admittance of the molten metal later. The mold is now put in a drying stove and exposed to a good heat, which melts the wax and causes it to run out at the hole made for that purpose. The core is supported by the wires before mentioned. It only now remains to pour the metal, and the process is complete. I have seen a modification of the process carried out on a fairly large scale for castings in a white metal alloy. The job was to cast some urns or vases weighing about seven or eight hundredweight each.

The operation was as follows: As much of the entire pattern as would lift from the sand in the ordinary way was prepared in sections to draw from the mold, but the main part of the pattern was sculptured with figures in relief, so a gelatine mold was taken off this part. A plain wooden body was made, smaller than the body of the pattern; over this was made a tin jacket to easily draw off. This body was placed inside the gelatine mold and wax was cast round, thus giving a wax pattern supported by the wooden body. This was now rammed in the mold in the ordinary way and the body withdrawn, leaving the wax embedded in the mold backed by the tin jacket. The use of this jacket was to let the heat of the stove get directly at the wax. The mold was now put in the stove, with a tray underneath to catch the wax. When the mold was dry and the wax all melted out, it was taken from the stove and finished. The mold was next placed over a separately prepared core in the usual way, and with all due precautions, cast.—[Fielden's Magazine.

At a meeting of the stockholders of the Pittsburg Stove & Range Co., held at Pittsburg, this week, directors were elected as follows: John B. Jackson, John B. Nicholson, A. M. Neeper, John W. J. Bissell, S. R. Baldwin, James F. McKee and John S. Graham.

The St. Louis & San Francisco R. R. has filed an equipment contract in which the road agrees to purchase 100 locomotives 27 passenger coaches, six postal cars and one dining car for $2,104,000. New York companies underwrite the contract.

The annual meeting of the stockholders of the Republic Iron & Steel Co., scheduled to be held Oct. 21, will be of special interest, as the plans of the company for important improvements and extensions are to be submitted for approval.

OBITUARY.

Richard Brown, who for many years was identified with rolling mill interests of Youngstown, having worked up from a roller to a large stockholder in several concerns, died in that city Sept. 8, aged 79 years. He was born in Ellicott City, Md., where his father was the manager of a rolling mill. He went to Youngstown when 21 years old, and, with his brother and Wm. Bonnell, organized the firm of Brown, Bonnell & Co., which purchased the Wick Bros.' mill. War prices enabled them to pay for the property, which was operated at very large profit. They were compelled to build another mill and their business increased so rapidly that several firms entered into heated competition to secure all the products of the mills. Finally Herbert Ayers, one of the mill's largest customers, bought out Thomas Brown's interest in the mills and attempted to run the business himself. Through lack of experience he failed and the property went into the hands of Fayette Brown as receiver. In the meantime Richard Brown sold out his interest and purchased stock in the Mahoning Valley Works, which he held and served as vice president until the latter was recently purchased by the Republic Iron & Steel Co. Since then Mr. Brown owned interests in the Tacoma mill, which he sold to Judge E. M. Wilson, and a mill in Hamilton, Canada.

Susquehanna Iron Co.

The Susquehanna Iron Co., Catawissa, Pa., which was incorporated Aug. 5 with nominal capital stock of $200,000, to be increased later, will operate the Danville blast furnace at Danville, Pa., and will manufacture foundry irons and by-products, such as slag cement, mineral wool, etc. The company holds leases and options on large tracts of land, both ore and limestone, which it proposes to develop as sources of supply. The furnace will be operated at the start on a mixture of Lake and New Jersey ores. The company is in the market for mining machinery, hoists, air plants, cars, rails, electric power plants, gasoline engines of from 20 to 50-h. p., and numerous supplies, having four operations to equip, also complete cement plant, crushers, etc., metal buildings for use at mines, furnace repairs, supplies, fire brick, stock barrows, scales, etc. Address H. R. VonDorster, Susquehanna Iron Co., Catawissa, Pa.

Independent Sheet Manufacturers' Association.

The independent sheet manufacturers of the country have formed a permanent organization, to be known as the Independent Sheet Manufacturers' Association, for the purpose of taking up matters from time to time affecting their mutual interests. James A. Campbell, of the Youngstown Iron Sheet & Tube Co., Youngstown, O., has been appointed temporary president of the organization. A secretary is to be appointed and an office will probably be opened up in Pittsburg.

The New England Foundrymen's Association, which has had two successful outings the past summer, resumed its monthly meetings on Wednesday, Sept. 9, at Boston. The announced program included an address by Wm. E. Viall, of the Brown & Sharpe Mfg. Co., and an illustrated lecture by George N. Kingsbury, commissioner from Rhode Island to the St. Louis Exposition. The program for the October meeting announces an address by Wm. H. Pfahler, of Philadelphia. Speakers announced for the meetings of the coming winter are: Thos. D. West, Edgar S. Cook, of Pottstown, Pa., O. P. Briggs, of Minneapolis, and Dr. Richard Moldenke.

John Peters, Jr., late manager of the Lawrence Furnace Co., Ironton, O., has brought action for the appointment of a receiver for that company. He holds a claim amounting to $9,700 against the company. This furnace was built in 1889-90, using machinery removed from Waldorf furnace, W. Va. Its annual capacity is 15,000 tons of strong Scotch foundry pig iron.

The directors of the Dominion Iron & Steel Co. and the Dominion Coal Co. have decided an absolute abrogation of the lease of the latter company. Stockholders will meet in a week, and a plan will be laid before them for ratification.

A FURNACEMAN'S COMMENT ON THE SITUATION.

To the Editor:

Nearly four years ago you published a personal letter written by myself to a friend touching the iron situation. The letter was called forth by the views of that friend, and was an off-hand production not intended for the public eye. Some remarks you have recently dropped and some dropped by the editor of the *Iron Age*, stir me to the point of effervescence again, not on behalf of the dear public, but of yourself, as an expounder before the public, in order that you may have food for reflection from varied sources.

You wonder how long the decline in the price of pig iron can continue without a readjustment of wages; the Southern producers are seeking relief from the pressure in lower freight rates; the *Iron Age* thinks the elements entering into the cost of iron are too high, with the exception of coke—and so on for a text.

Good common sense would have prompted a curtailment of output this summer, under existing conditions, rather than a reduction of prices to the present unprofitable level. Coke and Lake Superior ores are out of line with the price of pig iron, and perhaps labor also, but is it not possible iron is too low rather than these articles are much too high? The blast furnacemen are making their own prices, or rather a few are making them for all, and should not seek to pull down other industries to disaster, just because they have not the ability to sustain themselves. It did not stand to reason that the phenomenal demand and prices of last fall and winter would continue, or that consumption would keep pace with the enormously increasing capacity for production, blindly provided at great expense most inopportunely. In the nature of things a turn must come; we would have to get down out of the air on to solid ground. The situation was clear as to this and the only thing to do was to meet it with good judgment; limit the supply to demand, and not force the market at the expense of profits—reasonable profits.

Is it unreasonable to say that it is better to make 500 tons of pig iron at a profit than to make 1,000 tons at a loss? The price of ore was fixed early in the season; consumers of coke were generally provided for until the end of the year; wages were established, and we were, therefore, in position to know just what our metal would cost for a definite period. It simply remained with us to make enough to satisfy the demand without sacrifice of profit. Operating our blast furnaces three weeks each month would have produced the proper results. We could do this when iron was $25 per ton and coke unobtainable; why could we not do it voluntarily when conditions required it? The new plants just coming in cut some figure with the situation, but the determination to run to full capacity, if our neighbors did, or die, cut more. If we are bound to be asses it does not follow that we should make asses of everybody.

While it is true that ore and coke for the season were too high as regards their cost, that was a condition that would right itself in due time, and it was due to adjust ourselves to circumstances gradually rather than at one jump, ignoring results.

As to wages, it is a question whether they are too high or not, and extremely doubtful whether any good would follow their reduction. Our own people make our best market, and the more they earn the more they spend. Then why reduce their earning power simply to enable us to sell cheaper pig iron? If wages were cut 25 percent consumers might buy a ton of iron 50 cents less. What is accomplished by that? Manufacturers can compete with one another just as well with wages on one level as another. Wages are probably fairly equable the country over; then why seek to sacrifice labor on the employers' altar of ambition, pride, and foolishness?

Good wages are not a thing to be deplored in themselves although the effect of good wages on the workingmen seems most deplorable. The experiences of the last three years warrant the statement that as wages have increased efficiency has decreased, and that as labor has received more it has returned less, has become more indifferent, less stable, and in every respect less satisfactory. If this is to continue, if labor cannot stand prosperity, then the sooner wages are reduced the better for all concerned. It seems as if the workingmen of this country were doing everything possible to kill the goose that lays their golden eggs. But with an even scale of wages the fever and demoralization may in time subside. Let us hope on and have patience. Perhaps in due season the laborer will prove worthy of his hire.

To reduce wages in order to cheapen manufactures and work off our surplus wares abroad is all rot. We all need rest, and most of all the walking delegate. Instead of reducing wages we would better reduce output, take a vacation, relax our overtaxed nerves, and not exhaust nature's storehouse in the frantic endeavor to manufacture for the whole world.

It is not apparent to the naked eye that any permanent benefit would accrue by general or local reductions in freight rates. The railway managers, through the turmoil and hurrah of the past few years, have preserved their wits and equilibrium. Rates have advanced only gradually and reasonably and are not now excessive. Nothing is more important to the well-being of this country than that the railroads should be maintained upon a profitable basis. Cutting rates from any district (and particularly from the one you are pleased, for some queer reason of your own, to exploit as being able to produce pig iron for $7.50 per ton, in the face of its dividend record) would be of only temporary benefit to it, as the railroads of other districts would not long permit their patrons to remain at a disadvantage. It is to be presumed that rates are fairly adjusted the country over at this time, and that a disturbance of the schedule anywhere would mean a general disturbance, the result being simply lower rates and correspondingly lower pig iron. If the Southern furnaces can turn out metal at $7.50 per ton the North should be protected from their natural advantages by a greater differential in freight rates than now exists, and the said Southern furnaces should make more liberal distributions of profits among their stockholders. Northern furnaces at present are paying close to $8 for the ore alone that enters into one ton of pig iron, and for coke probably not far from $5. Why not sympathize with them a little?

FURNACEMAN.

Chicago Pneumatic Tool Co'.s Affairs.

Through W. J. Calhoun, general counsel for the Chicago Pneumatic Tool Co., Charles M. Schwab and C. H. Matthiessen, principal stockholders of the company, have issued a statement. After announcing that much misinformation has been afloat the statement says that Mr. Schwab's recently acquired holdings of Max Pam was a private transaction, and that relations between these two persons remain cordial. The statement asserts that President Duntley has not offered to resign, is not expected to resign, and that the two persons in control of the company do not want him to resign, adding complimentary expression as to Mr. Duntley's ability in the position he holds. The statement says further:

"It is true the executive offices of the company are to be removed to New York, and this fact alone has caused some of the directors to tender their resignations. Mr. Schwab is the largest stockholder in the company. He has expressed a desire to take an active part in the management of the company's business. Mr. Matthiessen also has expressed a willingness, under certain conditions, to take a place on the executive committee. The present holdings of both these gentlemen justify this action. But they both live in New York, and this requires that the executive offices be located there. When Messrs. Wacker, Chalmers and Lynch went on the board they only agreed to do so if the executive offices were located in Chicago. It was their repeated declaration that they could not give the time from their other businesses to attend meetings in New York. So when they learned of the proposed change in location, while not opposed to it, they felt it impracticable for them to continue on the board and executive committee, and have accordingly tendered their resignations. There is no other significance to be attached to their actions. It is also true the number of directors may be reduced. The present membership is fifteen, the members are widely separated, and it is oftentimes difficult to obtain a quorum. It is therefore thought better to reduce the board to nine. The company's business is prosperous and its future is most promising."

UNIFORMITY IN "MALLEABLE" HEATS.

A recent patent issued to Dr. R. Moldenke on a process of producing uniformity in molten material, is of especial interest to producers of malleable castings, as it aims at overcoming one of the bugbears of the ordinary malleable process in the air furnace or on the open-hearth.

Those who are familiar with this branch of the foundry trade will know that when the bath of metal is skimmed, and "up" in heat, so as to be ready to pour, the tapping of the melt at its lowest point brings out the metal from the lower part of the bath first. This metal is usually much colder than at the top of the bath, where it has been under the full stress of the flame, and yet it is generally from this top iron that a test plug is cast, on which the metal of the bath is adjudged ready for pouring or not. The consequence of this is that usually the first iron is too cold for thin castings, as these will not run properly. It is also too cold for the heavy work, as this will not chill properly. It will only do for the medium classes of castings, to pour which, and not the others, is the earnest endeavor of the foreman in charge, with more or less chances of success. Castings which are mis-run are weeded out and charged to profit and loss. Castings which are "low," that is, badly mottled or even gray, are not detected so easily, and the result of the anneal is bad iron only detected by the customer when something breaks. In describing the conditions which led to the perfecting of his process the inventor says: We will suppose the stream to be running from the furnace at the usual rate of about three-quarters of an hour for a ten-ton heat. The top iron was just right when the metal was tapped. This top iron is the last to come out, and doing so over half an hour after it was of proper composition and temperature usually means "high" or partly burnt iron. This is the case, no matter whether the fuel was cut off or not, as the highly overheated iron is certain to absorb gases, and deteriorate in quality. The consequence is metal which may show only small pin holes, or may be so badly burnt that it will not anneal at all. Here, then, is a loss also, and it is perfectly well understood in the malleable foundry that the end of a heat may not go into important light castings, where its use would seem most desirable. Often the last of a heat goes directly into annealing pots, to avoid any chance for trouble. With about one-quarter of a heat liable to cause difficulties, there is little wonder that attention has been given to the matter by the best minds, and the only solution of the problem would seem to get the hot metal off the top first in fact reverse the usual method of tapping, as it were. The heavy slag cover protects the metal in the steel process, so also to some extent the slag formed in the air furnace where gray and chilled castings are made, though this is by no means perfect. In "malleable," however, the very thing that seems most essential, the getting of the top iron first, has heretofore been impossible.

The most rational solution is therefore the tilting furnace. Here we have the ideal condition of pouring off the hot iron from the top just as we wish. The last iron comes off from the bottom, where it was least affected by the gases, or subject to the reactions going on in the bath, the uniformity of a bath of melted metal not always being as perfect as is generally imagined.

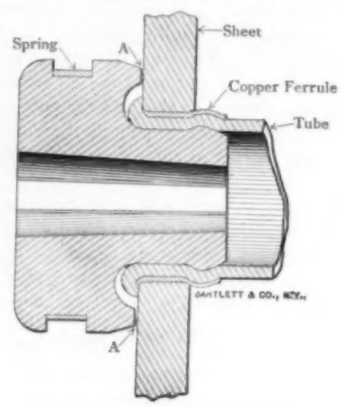
The tilting furnace has several disadvantages, the two most important being the great first cost, and the high bills for repairs. Malleable works do not invest in large units when it comes to melting iron, the sensitiveness of the process, when taken in connection with the length of time it takes to tap a heat, precluding this. So the tilting furnace will remain away some time yet. In the patent referred to the arrangement is to replace the usual single spout placed at the lowest point of the bath, by two or more at different levels, the idea being to tap the upper one first. When the top of the metal is thus removed, the second spout is tapped. Then the next, and so on. In actual practice a 15-ton furnace is provided with three such spouts, and experience shows that when the upper iron is off, the heat may be left under fire for some time before it becomes necessary to tap again, to prevent burning. The important point is gained in that the iron is never overheated to endanger its quality as malleable where this method is used, and the cost of the furnace no more than the ordinary.

In actual practice with this arrangement, the heat is tapped three times into six-ton ladles each time, this metal after being brought to the proper distrubuting point, going into the regular shanks and hand ladles. Usually the last 500 pounds are left in the first ladle when it goes back to the furnace, the second pour and finally the third is used to the last drop in all classes of castings indiscriminately, the first ladle going into everything but the very smallest work, this on account of the chilling effect of crane ladle, and hand ladle combined, before the molds are reached. The process is, however, equally good for the regular method of catching the metal off the spout in hand ladles, or for chill roll work and gun metal from the air furnace.

The process is described at length with a view of bringing out the peculiar requirements of the malleable business. The difficulties met with in turning out good metal, and then getting it into the proper molds suited to its composition and temperature are seldom realized by those who think of and do go into the malleable casting industry.

IMPROVED FLUE-BEADING TOOL.

The engraving shows an improved flue-beading tool for boiler work brought out by the Pratt & Whitney Co., of Hartford, Conn. This new device is employed in forming the inside bead in boiler tubes in fire box sheets. The old device for this purpose depended largely upon the accuracy with which the workman could hold the mandrel at right angles to the surface of the plate or the beading would not make a close joint between the tube and the sheet. The different parts of the tool



IMPROVED FLUE-BEADING TOOL.

are indicated in the engraving, and it will be seen that the points A A coming in contact with the sheet prevent the expander changing its position horizontally and thus ensures a more perfect contact between the tube, the copper ferrule and the sheet.

Among the recent orders given for locomotives are the following: The Coal & Coke Railway, two; Atlantic Coast Line, seven; East Jordan & Southern, one mogul; The Richmond, Fredericksburg & Potomac, all from the Baldwin Works. Among recent orders for new cars were the following: The Trinity & Brazos Valley, 50 freights from the Georgia Car & Mfg. Co.; the Temiskaming & Northern, 100 flat cars from Rhodes, Curry & Co., Amherst, N. S.; the Pittsburg Coal Co., 25 freight cars built at the Huntington Works of the American Car & Foundry Co.; the Bismarck, Washburn & Great Falls, 20 freight cars from the Pullman Co.; the Coal & Coke Railway, 10 ballast cars from the Rodger Ballast Car Co.; the Erie, 100 ballast cars from the Rodger Ballast Car Co.; the Pittsburgh & Lake Erie, 10 passenger coaches from the American Car & Foundry Co.; the Mobile, Jackson & Kansas City Railroad, 200 flat cars and 50 box cars from the American Car & Foundry Co.

The American Roller Bearing Co., whose plant at Boston was recently burned, has leased a shop formerly occupied by the Tripp Metallic Packing Co., South Framington, Mass. The building is being fitted up to take care of the large business of the company.

The Labor Situation.

AMALGAMATED SCALE QUESTIONS.

For the purpose of formulating a scale based on the tonnage system for all sheet mill men, a committee of eleven sheet mill workers is to be appointed by the sheet mill lodges of the Amalgamated Association of Iron, Steel and Tin Workers, to meet not later than Feb. 15, 1904, in the headquarters of the association, Pittsburg. The committee's report is to be published in the official program of the association for consideration at the Cleveland convention next year. This committee is to endeavor to draw up a scale which will be a solution to the present limit of output problem which is agitating the independent sheet manufacturers at the present time. The committee is to consist of two rollers, two heaters, two shearmen, one rougher, one catcher, one pair-heater, one matcher and one rougher.

At the conference of district vice presidents of the Amalgamated Association, held in Cleveland recently, a number of clauses in the present scale, over which there has been some misunderstanding, were defined as follows:

Clause 7 of the guide, 10 inch, hoop and cotton tie mills, relating to the extra rougher question, was interpreted to mean that the amounts stipulated are for determining what shall constitute a two, three or four-men job, in order to determine what fractional part of the total wages shall be paid by the roller. One extra man in excess of the two, three or four, as the case may be, must be employed to make the clause operative, but any number of men in excess of one, who may be employed on roughing rolls, shall in no way alter provisions of said clause.

On mills making over sixty-seven dollars, and where more than four roughers are employed, the roller must pay one-seventh of the fifth man's wages.

Clause 5 of the memoranda of agreement was defined as meaning that all guide, hoop, bar, tin and sheet mills shall not start earlier than 5 a. m. Monday and finish after the first turn Saturday.

THE RIGHT TO DISCHARGE WITHOUT GIVING REASON.

Carroll D. Wright, the umpire to whom was referred the five disputes between the operators' and miners' representatives on the board of conciliation appointed under the provisions of the anthracite strike commission, filed his findings at Scranton, Pa., Sept. 8, with the secretary of the board. Dealing with the question of employers' right to discharge men for any cause other than of connection with a labor union, Umpire Wright agrees wholly with the contentions of the operators' representatives and declares that the right of an employer to discharge without giving the cause of the discharge is sustained by the award of the commission. The umpire says:

"Taking the rulings of the court, the assertion of the anthracite coal strike commission, the clauses in the agreement made by and with the United Mine Workers of America and the admissions of the different members of the board of conciliation, whether on the one principle or on the other, there can be no doubt that a man has the right to quit the service of his employer whenever he sees fit, with or without giving any cause, provided he gives proper notice and that the employer has a perfect right to employ and discharge men in accordance with the conditions of his industry; that he is not obliged to give any cause for discharging, but that he should, as in the reverse case, give proper notice. This right to discharge must, therefore, be sustained. Any other view of the case would result in compelling men to work for an employer when they did not wish to and thus enslave them, when on the other hand it would compel employers to employ men whether they had work for them or not, and whether the men were incompetent or not, and would thus stagnate business and work to the injury of all other employes."

LABOR NOTES.

Satisfactory agreements have been reached between the boilermakers of the Milwaukee Railroad and the company, an increase of about 6 percent having been granted the men.

Influenced by the active efforts of the marine machinists to bring about a general sympathetic strike in the shipyards of New York and vicinity, the General Federated Labor Union of that city, after a bitter fight in open and executive session, has suspended the marine boilermakers from affiliation with the central body, and demanded of the marine blacksmiths and blacksmiths' helpers that they repudiate working agreements into which they have entered with the New York Metal Trades Association. Whether the blacksmiths and their helpers will comply with this demand is not known.

The striking coal miners at the mines of the Sharon Coal & Limestone Co., Sharon, Pa., a subsidiary company of the United States Steel Corporation, were enjoined last week from interfering with the operation of the mines. A full complement of men has been secured to work the mines and since the injunction was granted no trouble has occurred.

The annual convention of the National Association of Blast Furnace Workers was held at Youngstown, O., last week. The most important action taken was in favor of an eight-hour day to be demanded on May 1, 1904. Since this organization was formed similar demands have been made on two occasions, but the organization was never strong enough to make the blast furnace operators accede to a shorter day. It was also decided that strikes cannot be declared in the future without first referring the existing differences to the national officers of the organization and hereafter the membership is to be restricted entirely to men who are directly connected with the operation of blast furnaces. Heretofore all employes at furnaces were admitted to membership and much trouble was experienced in arranging wage scales. Officers for the ensuing year were elected as follows: James McMahon, Struthers, O., president; Charles E. Harding, Hanging Rock, O., first vice president; Michael Morrisey, Herculaneum, Mo., second vice president; M. O. Gorman, Newark, N. J., third vice president; Peter Thorson, Riddlesburg, Pa., fourth vice president; Michael Keenan, Buffalo, treasurer; William J. Clark, Buffalo, secretary; Charles Pritchard, of Shawnee, O., and H. C. Hamburg, of Ironton, O., trustees.

Last year the Labor Day parade in New York included 40,000 men. This year, by actual count, there were 8,700 men in line. The falling off is attributed to the refusal of workingmen to march behind Sam Parks, the walking delegate temporarily released from Sing Sing, who was grand marshal of the parade, riding near ex-Chief of Police Devery, his bondsman.

Through the instrumentality of Frank Buchanan, president of the International Association of Bridge and Structural Steel Workers, all the strikes induced by Samuel Parks against members of the Employers' Association and Iron League in cities other than New York, where they have contracts, have been called off. These included contracts in Philadelphia, Boston, Baltimore and Newark. As the strikes had been called without appeal to the general executive committee of the association and as the men have not received any assistance from the general body, the executive committee decided to restrict the scheme of operations to the one city and make the fight what it is considered—a local one.

The building strike at Minneapolis came to an end Sept. 8, work being resumed on all the large buildings. The differences between the building laborers and the contractors are to be arbitrated.

Molders employed in foundries in the New Castle, Pa., district have been granted a 10 per cent advance in wages.

George Crawford, general manager of the plants of the National Tube Co., W. A. Cornelius, superintendent of furnaces and rolling mills of the same company, together with several engineers, inspected the pipe mill at South Sharon last week.

No. 2 puddle mill of the lower plant of the American Steel Hoop Co., Youngstown, O., resumed operations this week after being shut down for the past five months.

The Lloyd Booth foundry of the United Engineering & Foundry Co., Youngstown, O., was damaged by fire to the extent of $5,000 last week.

PRODUCTION OF COKE IN 1902.

The production of coke in the United States in 1902, according to the report now in press prepared by Mr. E. W. Parker for the United States Geological Survey, exceeded that of any year in the history of the trade. The product, which includes the output from retort or by-product ovens, amounted last year to 25,401,730 short tons, as compared with 21,795,883 short tons in 1901, and with 20,533,348 tons in 1900. The increase in 1902 over 1901 amounted to 3,605,847 short tons, or 16.5 percent, and this increase would have been much larger had the transportation facilities been commensurate with the demand for coke and with the productive capacity of the ovens.

The unprecedented production of coke in 1902 was accompanied by an increase of value which was even more worthy of note. The average price per ton at the ovens was the highest recorded in a period of 23 years, and the total value reached the high figure of $63,339,167, an increase over the preceding year of $18,893,244, or 42.5 percent. The value of the coal used in the manufacture of coke in 1902 exceeded that of 1901 by $7,922,563, from which it appears that the value of the coke product increased $10,970,681 over and above the increased value of the coal used in its production. In 1901 the highest price obtained for Connellsville furnace coke was $4.25, which was paid in March and April of that year. In September and October of 1902, while contract coke was nominally quoted at $3 per ton, consumers were paying from $10 to $12 per ton for prompt delivery, and as much as $15 per ton was reported.

During 1902 there were 69,069 coke ovens in existence in the United States, as compared with 63,951 ovens in 1901. Of these 69,069 ovens, 67,124 were active and produced an average of 378.4 tons per oven. The total number in 1902 included 1,663 by-product recovery ovens, which produced 1,403,588 tons of coke, an average of 844 tons of coke per oven.

In the order of production, Pennsylvania ranked first, with 16,497,910 short tons, an increase over 1901 of 2,141,993 tons; Alabama came second, with 2,552,246 short tons, an increase of 403,335 tons; West Virginia third, with 2,516,505 short tons, an increase of 232,805 tons; Virginia fourth, with 1,124,572 short tons, an increase of 217,442 short tons; Colorado fifth, with 1,003,393 short tons, an increase of 332,090 tons—the percentages of increase for these States being: Pennsylvania, 14.92; Alabama, 18.77; West Virginia, 10.19; Virginia, 23.97; Colorado, 49.47.

The quantity of coal used in 1902 to produce 25,401,730 short tons of coke was 39,604,007 short tons, as compared with 34,207,965 short tons used to produce 21,795,883 tons of coke in 1901, an increase of 5,396,042 short tons of coal in 1902 over 1901. The value of the coal consumed increased from $31,378,631 to $39,301,194. In 1901 the value of the coal used in making a ton of coke was $1.44, and the average price per ton for the coke produced was $2.04, a difference of 60 cents on each ton. In 1902 the value of the coal used in making a ton of coke was $1.54, and the average price per ton of coke was $2.49, a difference of 95 cents on each ton of coke.

The quantity of coke imported into the United States in 1902 amounted to 140,488 short tons, valued at $423,775, as compared with 72,727 short tons, valued at $266,075, in 1901. The exports of coke in 1902 amounted to 439,590 short tons, valued at 1,785,188, as compared with 430,450 short tons, valued at $1,561,898, in 1901.

The Galena Iron Works, Galena, Ill., has recently increased its capital stock from $2,000 to $5,000, and will at an early date increase the capital to $20,000. The Galena Iron Works was established last spring, and has grown rapidly. It has purchased a plant formerly used by a packing company, and will convert it into shape for its purpose. The following are the officers recently elected: President and treasurer, C. C. Mathey; vice president, R. Barrett; secretary, F. H. Ives.

Russ S. Jenks, assignee of the Columbia Iron Works, Port Huron, Mich., has been ordered to sell the property Sept. 18. The order will be carried out unless, before that date, the creditors agree upon a plan of reorganization.

CHARCOAL PIG IRON PRODUCTION OF MICHIGAN.

The following figures from the records of the American Iron and Steel Association are interesting, as supplemental to the paper of President Wm. G. Mather, of the Cleveland-Cliffs Iron Co., presented at the recent meeting of the Lake Superior Mining Institute:

PRODUCTION OF CHARCOAL PIG IRON IN MICHIGAN FROM 1872 TO 1902.

Years.	Gross tons.	Years.	Gross tons.
1872	77,536	1888	190,403
1873	101,763	1889	191,389
1874	115,151	1890	230,769
1875	90,897	1891	213,145
1876	73,640	1892	184,421
1877	67,157	1893	117,538
1878	63,262	1894	95,171
1879	90,660	1895	91,222
1880	137,879	1896	149,511
1881	167,003	1897	132,578
1882	187,674	1898	147,640
1883	154,629	1899	134,443
1884	154,316	1900	163,712
1885	127,787	1901	170,762
1886	170,298	1902	155,213
1887	190,663		
		Total for 31 years	4,338,232

Tinning Cast Iron.

To be successful in coating with tin the castings must be absolutely clean and free from sand and oxide. They are usually freed from imbedded sand in a rattler or tumbling box, which also tends to close the surface grain and give the articles a smooth metallic face. The articles are then placed in a hot pickle of 1 part of hydrochloric acid to 4 parts of water, in which they are allowed to remain from one to two hours, or until the recesses are free from scale and sand. Spots may be removed by a scraper or wire brush. The castings are then washed in hot water and kept in clean, hot water until ready to dip. For a flux dip in a mixture composed of 4 parts of a saturated solution of sal ammoniac in water and 1 part of hydrochloric acid, hot. Then dry the castings and dip them in the tin pot. The tin should be hot enough to quickly bring the castings to its own temperature when perfectly fluid, but not hot enough to quickly oxidize the surface of the tin. A sprinkling of pulverized sal ammoniac may be made on the surface of the tin or a little tallow or palm oil may be used to clear the surface and make the tinned work come out clear. Some operators again dip in a pot of hot palm oil or tallow at a temperature above that of the melted tin, for the purpose of draining the excess of tin and imparting a smooth, bright surface to the castings. As soon as the tin on the castings has chilled or set they should be washed in hot sal soda water and dried in sawdust.—[Metal Worker.]

The bond plan of the Consolidated Lake Superior Co. having failed, it is now proposed to reorganize the company by the formation of a new corporation and the exchange of the old stock for new upon payment of assessments which will produce the amount of money which it was sought to raise through the issue of bonds. A syndicate is now being formed to advance the $8,000,000 needed by the company for the discharge of current obligations, and for additional working capital. At a meeting of the directors held last Thursday in New York, it was decided to return about $3,000,000 in cash, the amount deposited by subscribers in connection with the proposed $12,000,000 bond issue.

The Pennsylvania Railroad has just announced that it has ordered locomotives from France, Germany, Russia and England for exhibition purposes at the St. Louis Fair next year, and it may include engines from Japan and Italy in the exhibit. The Pennsylvania is making the exhibit to show the superiority of its locomotives over the foreign built, and incidentally to pick up any of the good points that they may possess. After the fair the engines will be put into service on the different divisions of the road under the charge of experts to determine their relative capacity with the standard locomotive of the road. Each engine will go to a division and will be tested and then sent to some other place.

The Wm. Ferguson Foundry Co. of Chicago, has become the Ferguson & Lange Foundry Co., and the business will be carried on as heretofore at Clybourn Ave. and Willow St. Wm. Ferguson is president and H. O. Lange secretary and treasurer.

AN INTERESTING MELTING EQUIPMENT.

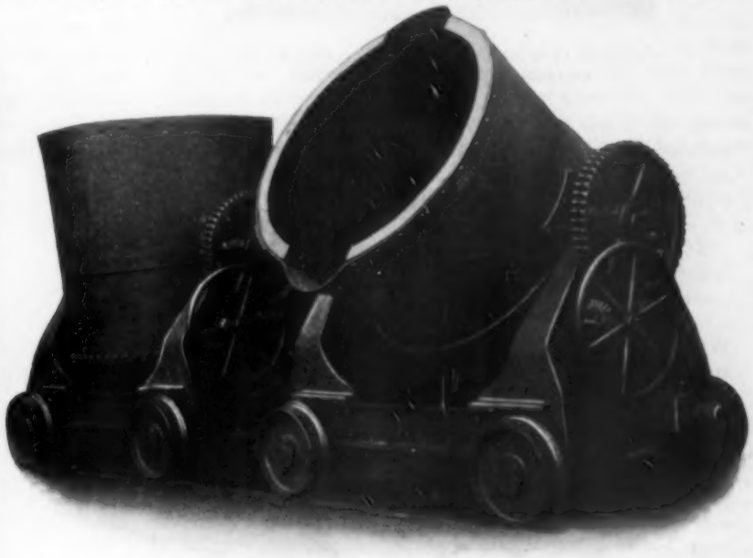
Among the earliest pioneers in the foundry industry to specialize its product and provide mechanical means for lowering the cost of its castings were the Atlas Engine Works of Indianapolis, Ind. This concern was also among the first to recognize the value of the air hoist and trolley track for rapidly handling molds, and in this respect is probably better equipped today than any other foundry in the country. In the matter of molding machines, one of special design was gotten up for the company's use a good many years ago, this being one of the earliest power ramming machines, known as the "Yielding Platen" machine, from the fact that pressure is applied through a strong rubber bag filled with water, attached to the ramming head of the machine. The object sought is of course to ram the mold to a uniform degree of hardness. Flasks of ordinary construction are used on the Atlas machine and where necessary gaggers may be set in the mold as long as these do not reach above the level of the flask. It is also the custom to leave the bars a short distance below this level, which facilitates even ramming.

THE ATLAS "YIELDING PLATEN" MOLDING MACHINE.

MELTING HOUSE AND ARRANGEMENT FOR ELEVATING LOADED CHARGING CARS.

At the present time the Atlas Engine Works operates three foundries, located in close proximity to each other. The old shops contain several molding machines of special design for turning out engine frames, these being of the stripping plate or pattern drawing type, the mold being rammed by hand. They are worked in pairs, one forming the cope and the other the drag. The chief advantage in these is that the mold is practically ready to close as it leaves the machine, whereas in hand molding the workman will spend considerable time in dressing up broken parts. One can hardly appreciate the rapidity with which a complete mold can be made, where every precaution has been taken to avoid tedious hand work. Foundry No. 2 is 70x300 feet in size and is largely given over to the molding of boiler castings. It sounds a bit queer to say that boiler fronts are turned out quicker than one can describe the operation, yet such is the case. These castings are not molded in one piece but divided into four sections, which facilitates handling. No attempt has been made to install a general system of sand conveying; instead the machines are ranged in pairs, one conveyor serving two machines. This makes each unit independent of the other and a breakdown of relatively small importance. Foundry No. 3 is intended for the production of heavier castings, such as fly-wheels and the like, and is 120x500 feet. The operators of molding machines are of course specialty molders in a very narrow sense of the word. They start in at $1.40 per day and after working two years receive the machine operators' standard pay of $2 per day. Naturally many of these find a chance to obtain better paid employment and new hands have to be constantly broken in. The number of this class of work-

A TRAIN OF LADLE CARS IN FRONT OF CUPOLA SPOUTS.

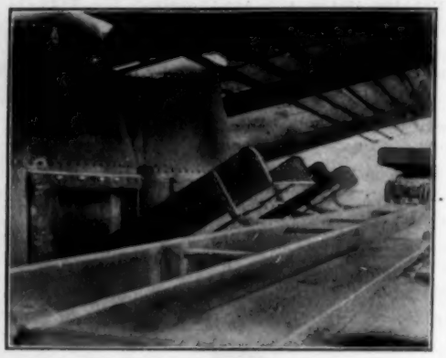


GEARED TRUCK LADLES, 10 TONS CAPACITY. MADE FOR THE ATLAS ENGINE WORKS BY THE WHITING FOUNDRY EQUIPMENT CO.

men in Indianapolis was thought sufficiently large by the Iron Molders' Union to justify it in instituting a separate local to look after their interests exclusively.

The economical handling of cupola stock and melted iron is a problem that confronts the manager of every large foundry. Where plenty of ground space is available this is somewhat simplified, and only the amount of money at hand places a limit upon the completeness of the equipment for the melting department. In the case of the Atlas Engine Works, its original site is covered with factory buildings of various kinds and it was therefore decided to concentrate the melting operations at one point and from this distribute the melted iron to the different foundries. The new melting house is located about a quarter of a mile from the foundries, and excellent switching facilities are provided for promptly handling material. The building has been planned to hold six cupolas, it being the intention to operate these on alternate days, unless the demand for iron should become excessive, when the full quota can be brought into use.

When completed the Atlas melting plant will require the minimum amount of labor in its operation. The charges of fuel and iron will be made up on self-dumping cars and after these pass the yard scales for checking, they will by gravity descend the track in the culvert shown at the left of the building, their speed being checked by the rising stub track shown in the foreground, which again gives them sufficient motion in a reversed direction so that the run upon the track leading to the upper floor of the melting house, where an electric hoist and endless chain belt furnishes an automatic lifting apparatus. A spring switch at the junction of the track from the yard with the track to the cupola platform permits a car to travel



CHUTES LEADING TO CUPOLAS. SELF-DUMPING CHARGING CAR IN THE DISTANCE.

from the scales to the cupolas without a hand touching it, quite an achievement in handling stock for cupolas. When the car has discharged its load it continues to the other end of the building, where provisions are made for two elevators to carry the empty cars back to the yard.

To the right of the melting house proper may be seen a lower structure having a sliding door, under which extends another conduit, in which is laid a standard-gauge track. This leads to the cupola spouts where the metal will be tapped into Whiting geared truck ladles, having a capacity of 10 tons each and conveyed to the different foundries. With everything in working order it is calculated that a ladleful of iron can be placed where wanted in less than five minutes, and the excellent system of trolley tracks existing in the Atlas foundries, will permit of the distribution of this iron in smaller ladles with remarkable rapidity. It sounds peculiar to speak of a foundry without a cupola, yet there is no doubt that where large bodies of metal are to be melted the concentration of melting equipment at one point presents certain features of economy over scattering this in several places, where each unit demands separate management and labor to operate it.

The Struthers Furnace Co., Struthers, O., has completed and in operation a cement plant, which is one of the largest and most complete of its kind in this country. Tests of the cement have been made by the city engineer of Youngstown and are highly satisfactory. David Tod is the manager of the plant.

TWO TYPES OF ABRASIVE MACHINES.

The improved No. 1 buffing and polishing lathe made by the Webster & Perks Tool Co., of Springfield, O., is illustrated in Fig. 1. The machine, like others of the same make, is of

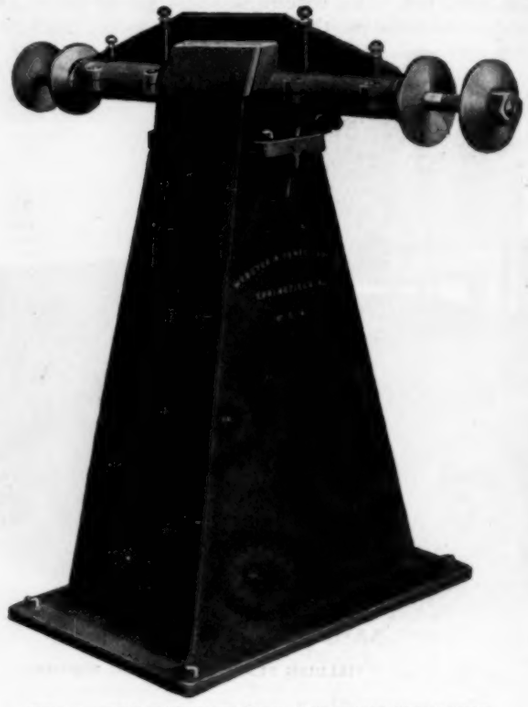


FIG. 1.—SELF-OILING BUFFING AND POLISHING LATHE.

rugged construction, as the makers are convinced that emery wheels mounted on such substantial frames will be more likely to run true from start to finish and stand up to the work. The machine has steel spindle, 1¾ inches diameter and each bearing 14¾ inches long. The lathe may be belted from above or below.

A sectional view of the device for oiling the bearings of the

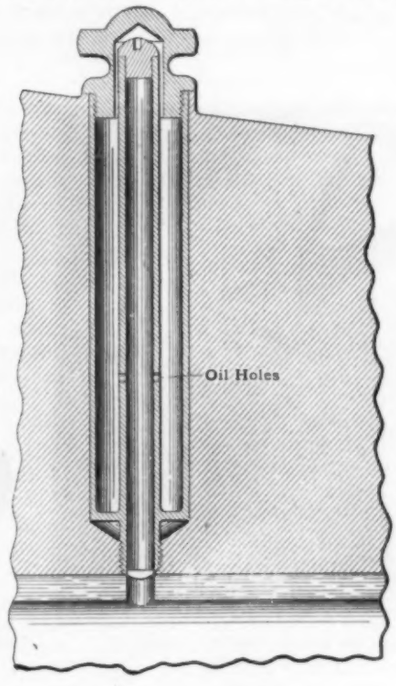


FIG. 2.—AN OILING DEVICE.

No. 1 lathe, and for keeping them clean and free from emery and cutting particles, is illustrated in Fig. 2, from which it will be observed that it is provided with an improved oil cup. This cup has a capacity sufficient to keep the bearings lubricated for some days without refilling, and immediately in its

center is inserted a tube. This is closed at the top, and provided with a screw-driver slot, and at a distance from the bottom thereof are two holes for admitting the oil to the bearings, and at the same time permitting any foreign particles to accumulate in the bottom of the cup, similar to a trap.

The 2-inch self-oiling grinder is shown in Fig. 3. The bearings are 12 inches long and spindle is 57 inches long. The journals of this machine are lubricated by means of a channel directly through the bottom of the box, admitting the oil from the bottom of the journal instead of from the top. This system is shown in Figs. 4 and 5 and the fact that the oil cup proper stands one-half inch higher than the bottom of the journal, alone is sufficient to make it self-oiling. The average man employed in grinding with emery wheels, in oiling his machine is not careful to cleanly wipe away emery and dust that necessarily collects around the oil holes, and will, when oiling the ordinary grinder, wash particles of emery with the oil into the bearings. With this device, it does not matter how much emery or grit is carried into the oil well, emery being the heavier will settle in the bottom. This well may be cleansed by removing a three-eighths inch plug, which is shown directly underneath the oil cup in illustration, and with the aid of a piece of wire and waste, accomplish this with the least possible inconvenience and without disturbing the bearings or working parts of the machine.

FIG. 3.—2-INCH SELF-OILING GRINDER.

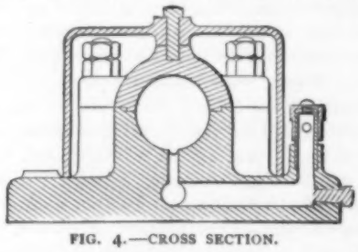


FIG. 4.—CROSS SECTION.

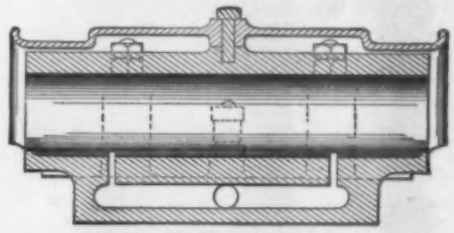


FIG. 5.—LONGITUDINAL SECTION.

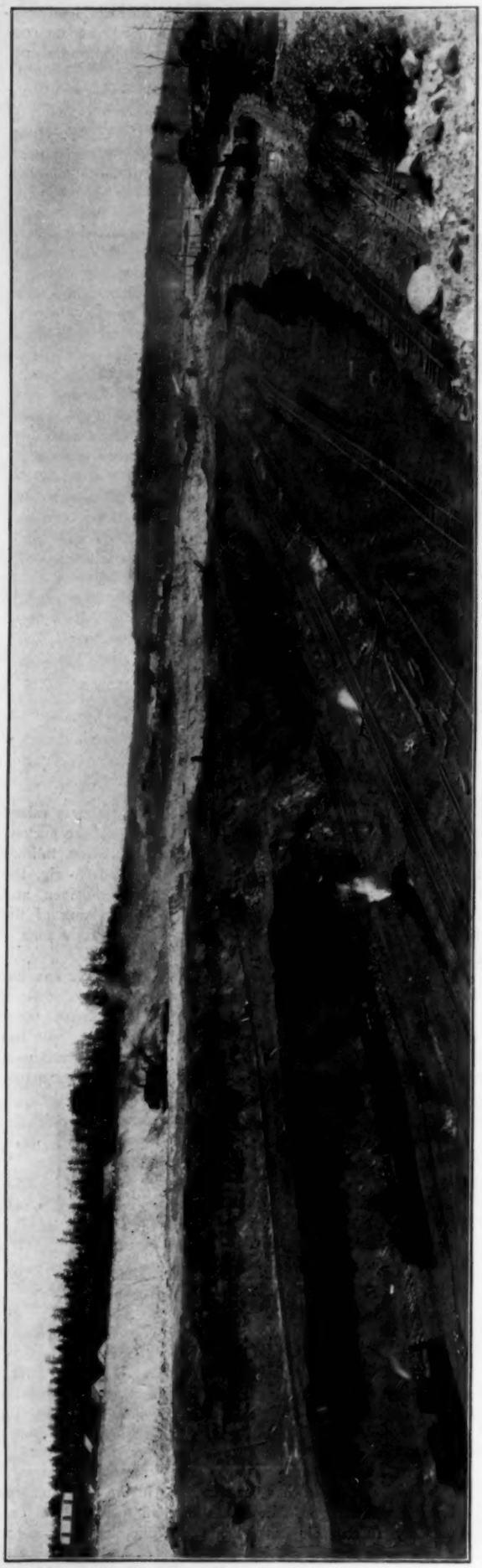
Colorado Fuel & Iron Co.

At a meeting of the board of directors of the Colorado Fuel & Iron Co., of Denver, Colo., held at New York last week, Col. Frank J. Hearne was elected chairman of the executive committee and president of the company. J. F. Welborn was elected vice president and D. C. Beaman, secretary. The offices of second and third vice presidents were left vacant. Col. Hearne succeeds J. A. Kebler as president and Mr. Welborn succeeds A. C. Cass. The following executive committee was elected: F. J. Hearne, John D. Rockefeller, Jr., George J. Gould, F. T. Gates, and John C. Osgood. The dividend was passed for the reason that the company is in need of $8,000,000 to complete its plants and provide a working capital and about $5,000,000 additional to pay off a floating debt.

The coal handling machinery installed by the C. W. Hunt Co., West New Brighton, N. Y., at the Lincoln Wharf power station of the Boston Elevated Railroad Co. recently lowered the world's record for rapid unloading. The coal was raised 90 feet above tide water and delivered to the storage pockets at the rate of 320 tons per hour. The installation follows in general design the standard Hunt steeple tower rig, the moving gear and coal cracker being electrically driven, and the hoisting engine direct connected. The overhang of the folding boom is 40 feet, and the capacity of shovel 2 tons.

The Dillon-Griswold Wire Co., of Sterling, Ill., has entered suit against the Northwestern Barb Wire Co., of Rock Falls, for infringement on the square mesh wire fence machine patents owned by the former company. Suit has been brought for $50,000 and for an injunction restraining the Northwestern Barb Wire company from the further manufacture of fence on these machines. The Dillon-Griswold company, in addition to its suits, has begun suit against W. M. Dillon for $83,000 open accounts, charged to Mr. Dillon during his term of office as president and manager of the Dillon-Griswold concern. Mr. Dillon is now managing the Northwestern Barb Wire Co.

O. C. Erickson, who has been engaged in the boiler making business in Muskegon, Mich., has decided to locate in Traverse City, Mich. He has leased a building and will install complete equipment for the manufacture of boilers, extensive repair shop and heavy blacksmithing. Mr. Erickson will continue the operation of his Muskegon plant until next spring.



RECENT VIEW OF STEVENSON MINE, MESABI RANGE.

TWO OF THE LARGE MESABI RANGE MINES.

Since Amos Shepard, formerly of the Minnesota Iron Co., took hold of the Stevenson mine, it has undergone a complete transformation. The Stevenson is a very large shipper, though only three years old. Last year it produced 1,436,000 gross tons, all from steam shovel mining, the year before 666,000 tons, mostly from the shovels, though a part was from a shaft that had been sunk the season before and from which was won the mine's initial product of 56,000 tons in 1900. When taken by Corrigan, McKinney & Co. in that year it had been explored to show some 8,000,000 tons. Explorations were continued and the amount was gradually increased until it was doubled. The past few months' stripping has been carried on at the mouth of the pit, where the shovels are located, that are shown in the stripping in the illustration elsewhere, and a very large addition to the tonnage before figured has been made. This year's production is quite largely from the east end of the pit and the season will show a diminution from last year. The mine has produced so far this year about 800,000 tons, and will not make much more than 1,000,000, so that its year will end shortly. This diminution is merely the result of market conditions and a desire to let things become more cleaned up at the eastern end of the lakes before pushing ore forward.

As is shown in the picture, there are two levels of ore in which shovels are at work. The company employs the largest machines in the Lake Superior region, shovels of 105 tons that will fill a 50-ton car in less than 10 dips. Stripping at this property runs from a slight surface up to more than 40 feet. The location is not shown. It lies to the west on the north bank of the mine, beyond the upper left hand corner. This, which was a most unattractive spot, has been so transformed that it is now one of the neat and clean locations of the range.

Fee ownership of the Stevenson is in the hands of the Great Northern road, which bought it from a lumbering firm some years ago, when the existence of a portion of the deposit had been proved. This mine was a minor part of the purchase, but it will more than pay for everything, including the Duluth, Mississippi River & Northern Railroad, the Mahoning mine, and a vast tract of rich ore lands. Corrigan, McKinney & Co. have the mine under a sliding scale of royalty and on the proposed output of this year pay 12½ cents a ton.

A year ago, in April, the Burt mine location, shown in the accompanying illustration, was a tangle of brush and pine stumps. Last summer a stripping contract was given Messrs. Winston & Dear and they have been at work ever since with from one to four shovels, day and night. In the period mentioned they have stripped the surface from a space 500 by 1,500 feet, averaging in depth more than 40 feet, and running to over 50 feet. In all 1,000,000 cubic yards of material have been moved. The stripping was so far completed that a few weeks ago shipment commenced and it is to be pushed so rapidly that it is hoped to send forward this season about 1,000,000 tons of ore. No such record for rapid work has ever been made in any mining region and it reflects the greatest credit on the officials of the United States Steel Corporation, whose property this is, and on the stripping contractors. The Burt has been for many years a portion of the Lake Superior group of mines, which began shipping in 1895. It was always a small underground property and was not considered especially desirable on account of the fineness of its ore. Renewed explorations and a demand for the class of ore it produces have changed all this and it is one of the very largest mines the present season.

Fee ownership in this mine is in the hands of W. R. Burt, of Saginaw, Mich., and of the State of Minnesota. Mr. Burt secured his part of the land for its pine timber, without the slightest idea of the presence of ore, from which he will this year derive a revenue of about $175,000. The State's ownership is from the organic act, which put sections 16 and 36 in every township into the hands of public school funds. The school funds will therefore get this year about $75,000 from their ownership in this tract. Royalty on the Burt is 25 cents a ton.

EMERY WHEEL PRACTICE IN FOUNDRIES.*

BY CHARLES G. SMITH.

An attempt to discuss in an exhaustive manner the possibilities of emery wheel practice plunges us into a subject of enormous depth and far-reaching effect. As this practice in our industrial institutions is but in its infancy, the last few years have tended to elevate it from a necessary evil to the eminent position of one of the most modern and economical practices of the present day. Its field broadens daily, as our mechanics recognize its importance, its limitations not being confined to any one department, but its practical uses rendering it adaptable to all branches of manufacture.

This condition has been brought about mainly by the persistence of the few who have had faith enough in its success in ascertaining, at an enormous expense to themselves, the facts in the case, and forcing it into practice against much prejudice and opposition. With all new methods in shop, there is invariably considerable opposition, and many impediments are placed in the way of the success of anything that is at variance with the customs that have been in vogue. But those who have championed emery grinding have finally succeeded, with considerable effort, in having it placed among those important places alongside the other machine tools in the shop and factory.

A few years ago in nearly every shop, and at present in a great many shops, when one is about to buy an emery grinding machine, it is his opinion that "most any" style of machine will answer the purpose; and when this machine is received, it is set any place in the shop without regard to stability. Any pulley that may be lying around the shop will be put on the line shaft, and any emery wheels had from stock in some supply house will be put on the machine. Because they look to be running fast the speed is correct. No consideration is given to the diameter of the spindle in selecting the size of the wheels that are to be used on the machine. After such careless consideration good results are expected; if they are not obtained the conclusion is reached in very many cases that satisfaction cannot be had by the use of emery wheels. But, on the contrary, if the proper care is taken in the selection of the machine, and as much care taken in setting it up, and the proper speeds and grades obtained, it is surprising to know the increase of efficiency. As the conditions vary in most every shop, the above points should be ascertained by the party proposing to furnish the machine, as very many things are to be considered in obtaining satisfactory results.

Adaptation to Service.

There are many kinds of emery grinding, foundry grinding and machine shop grinding, and each of these can be subdivided into a number of different classes of work. In iron foundry work very little grinding can be done with economy on heavy castings, unless the iron is hard, in which case the swing frame machine with about a 20x2½-inch wheel, running at 1,200 r. p. m., will grind considerably faster than it could be chipped. The amount of gain in grinding will depend, of course, on the hardness and ductility of the iron. I have seen iron castings so hard that it took two men 1¾ hours to chip the gate and fin from one side. In such cases as this, two men could have ground this gate and fin with a swing frame machine in a very little over fifteen minutes.

But on soft iron the advantage is in favor of the chipping, as in this case the iron spawls before the chisel, and the man with one blow of the hammer can remove considerable of the gate and fin, which gives a great advantage in favor of the chipping. In a great many foundries I have noticed that the grinding on light castings has been done on light machines, using small wheels, and in almost every case the machine has been set without any regard to its stability.

Now, you will invariably be reimbursed, if in buying an emery grinding machine, you purchase a heavy stand with long bearings and large diameter of spindle; and by placing it on a concrete foundation, you will find that the machine will run a great deal smoother than if it was standing on the floor, which will enable the wheels to run smoothly and cause them to become out of true a great deal less than were they set so that there may be vibration in the spindle. This it has become out of true, you will receive more than reasonable interest on your investment, in the foundation, in the amount of emery that you save in truing your wheel.

VIEW SHOWING RAPID DEVELOPMENT OF BURT OPEN-PIT MINE, MESABI RANGE.

Then it is often the case that wheels too small have been used to accomplish satisfactory results. The largest diameter wheel practical should always be used for doing any kind of grinding. For instance, a wheel 24 in. in diameter will do more work per dollar invested down to 18 in. in diameter than an 18-in. wheel will do. Another point to be regarded is the belt power furnished to drive the wheel. It is very necessary that there is belt capacity enough on the machine to keep the wheels up to speed while they are under duty, as the speed of a wheel when running idle will have no effect on the work, if it is not kept up to this speed when it is doing the work.

Neglect in the above mentioned points has caused many to abandon the practice of grinding their castings with emery wheels.

Examples of Foundry Grinding.

For grinding any castings in a foundry where the man can lift the casting up to the machine, it will be found that the most economical and satisfactory results can be obtained by having a heavy machine with a 24x3-in. wheel driven with a 5-in. belt, wheels speeded at 1,000 r. p. m. This will give you wheels heavy enough to resist pressure of the work will cause considerably less dressing of the wheel, and, as it is always necessary to dress the wheel to the lower point when

*Read before the Pittsburg Foundrymen's Association, Sept. 7.

that will be forced to the wheel, and the power that is in the belt will force the wheels to cut instead of shrinking from duty and becoming out of true, which invariably happens where the belt power is insufficient, and the man pressing at uneven pressures will bring the whole to slacken its speed at intervals.

In steel foundry practice, the emery wheel has been found to be quite a success, and is as far ahead of any other method that is commonly in use to a large scale on both heavy and light work, as is the same in malleable iron foundries.

I have seen a gate ground with an emery wheel, on a swing frame grinder, by two men in less than fifteen minutes. This same gate would have required about two and a half hours to plane or shape from the casting, so that you will see that the saving is enormous in this instance over and above the machine work, and as compared with chipping by hand where two men are required, it will make a great deal better showing than above stated.

Within the last few years large grindstones have been, and are being displaced by the emery wheel to a very great extent, and I believe that within a reasonable time the grindstone will be a relic. This change has been attended with many difficulties, as prejudice on the part of the consumer has placed many an unnecessary obstacle in the path of success, but the advantage was so strongly in favor of the emery wheel that every obstacle is being surmounted, and for many purposes many firms have discarded their grindstones, and have found it economy to equip with new emery wheel machinery entire.

For instance, in grinding plows, which has always been done on grindstones, this has undergone an entire reformation of practice. Nearly all plows, no matter how they are made, whether tempered or chilled, are now ground on emery wheels.

At first the manufacturers of the plows claimed that this could never be accomplished, and raised one objection after another, first stating that the temper would be drawn, next stating that the man could not earn a day's wages. Next they would state that the emery wheel would not last long enough to overcome the difference in the cost between the grindstone and the emery wheel. One by one all these were overcome, until at present the men are making more money per day than they were on the grindstone, the practice is a great deal cleaner, as they do not have to work in a sloppy shop, as they were compelled to with the grindstone, and the cost of the emery wheels as compared with that of the grindstone has given considerable of a saving to the manufacturers. In some instances they are saving enough to justify their throwing out the old equipment and installing an entire new plant and building new buildings for doing this kind of work.

Some Machine Shop Examples.

In machine shops the development of uses for emery wheels has been remarkable, and there is today an immense amount of work done with the emery wheel in the machine shop that a few years ago was not considered as practical. In a shop in western Pennsylvania, a recent test was made where a shaft which had 1-64 in. all around to be removed was placed in an emery grinding machine. At the same time a duplicate of this shaft was placed in a lathe. The grinding machine finished the shaft in a little over 37 minutes, leaving it in better condition than the lathe, on which it took two hours and eight minutes to finish. Another test on an emery surface grinder with a wheel 12x2 in., medium hard and very coarse, on cast iron, showed most excellent results with a cut ¼ in. deep, ⅛ in. cross feed and 35 ft. table feed per minute. This seems almost incredible.

The most recent development in design of emery grinding machines is a surface grinder with a circular table, similar to a boring mill, the wheel about 16x2 in. and to be automatically fed in to the center and out to the edge. The machine is so substantially built that for heavy cuts and accurate work it is well adapted to grind valves of steam pumps, air compressors, etc., to leave them perfectly tight. This will tend to show that the emery grinding manufacturers are determined to invade all branches of machine shop practice.

There is also another machine being designed at present, for grinding very heavy shafts, that is intended not only to finish the work, but where shafts can be cast or forged reasonably close to size, the emery grinder will remove the stock and also finish the work without having to put it on a lathe for the roughing cut.

Points to Be Considered.

In obtaining results in emery grinding, several things must be considered: 1. The required condition of the work when finished whether it is to be polished when taken from the machine, or polished by buffing afterwards. In the latter case the number of emery that is used in the buffing must be considered. It is to be considered also if the material to be ground is tempered or not, before or after grinding. 2. How much stock is to be removed. 3. What is the nature of the material to be ground—cast steel, machinery steel, chilled iron, cast iron, brass, malleable, and is it hard or soft? 4. Are the pieces light or heavy? How much metal is there in the part to be ground, to absorb the heat? All these things must be considered to ascertain the proper method of performing the work and the grain and grade of wheel to do it correctly.

In regard to grain and grade of wheels, I would say the best results are always obtained by using as coarse a wheel as possible and hard as possible, as a coarse, hard wheel will not fill with metal so easily, and being hard will not scratch so deeply.

In a recent test that I made where the steel was hard and to be tempered and very highly polished, we produced much finer work on a wheel 6x8 in., made of No. 16 emery and hard, than did one of No. 46 material, and softer. The latter made deeper scratches that could not be polished out, and the former left the work in excellent condition. When polished, it was in as perfect condition as after having been ground on a grindstone.

Better results will also be obtained by using wheels of large diameter—the larger the diameter of the wheel the better the results. I have had parties complain to me in shops and foundries that they were not able to get any results from grinding their work, and upon examining the conditions found that they had a small machine, carrying a 14-in. or 16-in. wheel about 2-in. face, the machine merely bolted to the floor with considerable vibration in it. I induced these same parties to install a substantial machine and use a 24x3-in. or 4-in. wheel, running it at 1,000 r. p. m., having the machine on a concrete foundation, and they were astonished at the difference in the results.

For heavy steel castings, chilled iron or hard iron castings, excellent results may be obtained by the use of a swing frame grinding machine with an elbow joint, operating with a man on each side of the wheel. I have seen a steel gate on a heavy steel casting 5½ in. in diameter, ⅝ in. high, ground entirely away in 13½ minutes with one of these swing grinding machines, with two men operating the machine.

Another point of considerable importance is the speed at which the emery wheel runs. You should be just as particular in getting the proper speed at which to run an emery wheel as you are in procuring information to start a planer or a lathe or any other machine that you are setting in your shop. Were you to buy a planning machine and ask the manufacturer for the speed, which he would advise you to be 375 r. p. m., you would not run it at 250 r. p. m. or 500 r. p. m. On an emery wheel a few revolutions per minute may mean a great deal in results.

In a test made to ascertain some facts on this point, a machine was rigged so as to give a uniform pressure against the wheel. A piece of steel was cut exactly in half and the wheel speeded at 5,000 ft. peripheral speed per minute, and one of these pieces of steel was ground on the wheel under those conditions. Then the wheel was speeded to 6,500 ft. peripheral speed per minute, and under the same pressure the other piece of this steel was ground. It was learned that about 2¾ times the metal per cubic inch of emery was ground at 6,500 ft. per minute that was ground at 5,000 feet per minute, and this same amount of grinding was performed in three-fourths of the time required at 5,000 feet per minute.

At a meeting of the creditors of the Structural Steel Car Co., of Canton, O., U. S. Johnson, of Canton, was appointed trustee of the company.

DRAWING ROOM PRACTICE IN MANUFACTURING.*

BY J. L. KLINDWORTH.

Due to the effort of our pioneer engineers and on account of the survival of the fittest, the engineering department has come to be considered of prime importance in a manufacturing concern. A firm which 25 years ago employed one or perhaps two draftsmen, is often found to have a force of from 10 to 20, or even more. The number of drawings turned out in those days being small, there was not much effort made at having a system. Frequently the drawings were not even made of standard sizes, and as for record, it was usually the memory of the draftsman, assisted perhaps by a label on the drawer giving the class of work which, however, might still necessitate having to look at most all drawings until the desired drawing was found. The amount of work and number of drawings increasing rapidly, such practice was soon found to be badly wanting. After looking for some avenue of relief from this state of affairs, a heroic effort was made to systematize the work and record-keeping. Those who have gone through such a period know how many points come up for consideration, to make the new system fit the existing circumstances. Of course, any one system will not suit all cases on account of the great variety of engineering work.

The writer is best familiar with rolling mill and steel works practice and the manufacture of rolling mill machinery. In the following I shall briefly outline the work and system of an engineering office of a manufacturing concern producing a variety of rolling mill machinery:

The work would involve: (1) The making of drawings and prints and keeping record of same; (2) Keeping record of foreign prints; (3) Issuing order; (4) Keeping record of work passing through the office; (5) Miscellaneous, such as indexing catalogues, technical books and correspondence. It is assumed that the order, together with all necessary information for a certain machine, is received by the engineer or chief draftsman from the estimating or contracting department. The order number being entered, all the time on drawings for same should be charged against it.

Coming now to the making of drawings, something may be said of size and numbering of drawings, designing, detailing, piece numbers, etc.

Size of Drawings, Notations, etc.

I would recommend two sizes—the largest size for general drawing 21x30 inches on outside, with ⅜-inch margin line all around, and regular sheets 15x21 inches for detail or shop drawings. The latter would be numbered consecutively, also the large sheets, but with a letter A preceding the consecutive number. Only a few details should be put on each detail sheet, which is advantageous in a number of ways, quite obvious to those who have had experience in this line. All general arrangements should be made on linen back paper, and preserved after tracings have been made from it.

When taking up the design the draftsman should be furnished with a notebook, wherein to make all calculations pertaining to the design. This book, of course, to remain the property of the company, and which could be referred to in case questions in regard to strength, etc., should come up. The general design being completed, it is usually good policy to let the machine and pattern shop foremen have a good look at it. After that, the details may be drawn out. It is here that great care should be exercised in making such a drawing as shall show clearly what is wanted.

I might here mention a few points, frequently overlooked, which would help the workmen considerably in understanding the drawing and in erecting a machine. Gears and levers should be shown in connection with their shaft, and always noted from which side the key is to be driven—something, by the way, not one-half of the detailers think of doing.

If the gears cannot be shown on shaft, then it should be indicated where the wheel-seat is, and the mark of the gear given. Another point is concerning diameter of shafts and size of bore for wheel or crank. The shaft should be turned to size, and the wheel bored for whatever kind of fit is desired.

In drilling for bolts, it should be stated what size of holes are wanted, and not as is usually done, drill for ¾-inch or 1-inch bolts. Where the bolts are not to fit the holes, it is much better to have the holes drilled ⅛ inch larger to allow for errors in spacing. Holes for fitted bolts should be marked, "drill and ream." Attention to the above will often save the workman a trip to the foreman and time thereby. In connection with this might be mentioned something about coring holes for foundation bolts, which are invariably made too small. They should be cored at least ¼ inch larger than bolt diameter for small sizes, and at least ½ inch more for larger sizes. A great many additional points might be mentioned, but shall leave that for the discussion.

The tracing I prefer to have made on the dull side of the cloth, because the ink runs easier and any erasures do not injure the surface to the same extent as the glossy side.

The title, firm name, date and number should be in lower right hand corner. Finished surfaces to be indicated by the letter "f," cross-sectioning of all material to be alike; the bill of material is for the purpose of giving what material is wanted.

If the material is changed, as is frequently the case, from cast iron to steel casting, then it need only be changed in one place. The bill of material should also be on the right hand side of the sheet. The bill to have five columns, headed—(1) Piece mark, (2) Number required, (3) Material, (4) Name, (5) Remarks. The lettering should be as plain as possible. All shading and shaded lines should be omitted, for it seldom makes the drawing clearer to the workman, but always takes more time.

Numbering of Drawings.

Assuming the drawing completed, next in order would be to give the parts a mark of identification. Here is where people differ very much as to which is the best system. What appears to me the best system for a concern making a variety of machinery is to number the drawings consecutively, filing 50 in a drawer. The pieces to be marked with large letters of the alphabet. A piece A, on drawing 230, would be known as 230-A. This mark should be stamped on pattern, and also be nailed on same with about ⅜-inch metal letters and figures. This mark to appear on castings. Parts on general arrangement should be also marked. If any change is made on a pattern, for instance if used for a different machine, then a new mark should be given, but reference always be made to original pattern mark. Pieces which are what is termed right and left should be marked: 1—Required as shown, A. 1—Opposite hand, B. Some have a system in which a machine is given a number or letter. This is usually good enough until it is found convenient to use a certain part on two or three different machines, then it proves troublesome. Such a system, furthermore, requires an additional index for machine numbers. The system advocated, however, does not; all that is required is a card index. If one wishes to find the drawing for a certain machine part, he need only take its mark and look up the drawer containing the range of numbers, which includes the drawing number sought. This could be done without having to consult the card index by anyone to whom the system had previously been explained. The drawings, by the way, should be filed in order, the lowest number in bottom of drawer.

So many systems depend for their effective working upon the memory of those in charge. This is altogether wrong, for what guarantee has a firm that their employes will stay with them or not die? If either of these things happens, then there is usually confusion for some time to come.

The giving out of drawing numbers, filing and indexing, should be the duty of a particular person. No draftsman should be allowed to file a drawing. The marking of pieces as mentioned before, adapts itself very well for keeping track of patterns. This can be done by means of the card index, which is kept by the pattern shop foreman or his clerk. The index giving the shelf or bin where pattern is located. All heavy patterns can be kept on the ground floor of the pattern storage building, and all smaller ones on upper floors, in preference to keeping all patterns for one machine together. Patterns of a similar nature can be kept together if so de-

*Read at the June meeting of the Engineers' Society of Western Pennsylvania.

sired. By means of the index and additional slips the whereabouts of the patterns may easily be determined.

The Keeping of Records.

This is quite a necessity of any office. It frequently happens that a change is made on a drawing, and prints have to be substituted. If a record is kept of prints, it is quite an easy matter, but not so if one has to depend upon memory. If a print is issued to any department or person, it should be given a consecutive print number, which is easily stamped on. A card with the person's name, print number, drawing number and date is filled out by the blue-print boy, attached to the print, and signed by the recipient and returned to the drawing-room and filed in a case according to drawing number. It might also be desirable to keep an index of name of persons who have received prints, for the purpose of reducing the number of acquisitions of prints by the unscrupulous. If a revision is made on a drawing, it is only necessary to consult the index, reissue prints, at the same time recalling those which are out.

When such prints are received they should be entered in separate index from office prints, always marked date received and a special number given. If they are for a contract, then I should have enough sets furnished, so that the different departments could be supplied and keep one set in the office for record. If of larger size than standard, they could easily be cut or divided and pasted on heavy paper, the pieces marked, and then given a regular consecutive number. The prints should be traced and the tracing filed with the regular drawings.

All ordering of new and repair work should be done by the engineering department to avoid mistakes. The order sheets of say 10x13 inch to be fashioned after the bill of material on drawing, with columns added for weight, foundry pattern, and machine work. Enough copies to be made for all departments; one copy, of course, to remain in the office for filing. All order sheets should be sent to the superintendent, from whom they are distributed to the different departments. A record should, of course, be kept for ready reference, if it should be desired to know what was furnished for a certain order.

For keeping the record of work passing through the office, the following method is easily kept up and has proven itself quite satisfactory:

To begin with, I keep a small pocket notebook wherein all sorts of notes are entered promiscuously. The notes are afterwards entered in a larger book about 8x10 inch, classified as to departments, which, however, could be applied to order numbers as well.

From these notes a daily program is made up. When work is commenced pertaining to a certain item, I mark it with a cross, and when ready to trace with another mark. When completed and checked, the line is crossed out entirely, and when all work noted on a page has been attended to, the leaf is taken out. By doing this, one has only a few pages to watch and leaf through. The notes are written on one side of the leaf only. For unchecked drawings a separate list is kept by the clerk. The entries are made whenever a new drawing number is given out. Opposite the number is given the order number. This record might be kept by card index, but I find the above more convenient and quicker.

Miscellaneous.

What are known as standards should be gotten out in book form and given to the men to insure uniformity of details. Record books of pulleys, sheave and gear wheel patterns should also be kept for reference. For gear wheels, a book say 10x12 inches, will do. The columns reading from left to right to be marked: Pitch, Pitch Diameter, a wide column for teeth particulars, as (number, form, cast or cut and height above pitch line) face, arms, pattern made for cast iron or steel casting, drawing, mark, date and remarks.

The usual practice is to get the tracings out for reference, which is a good way to wear them out. A much better plan is to have instead sets of prints containing all drawings for a machine. This saves the tracing, and has the further advantage that one has all the information at once. The contents of the set are marked on the binder. For convenience, the sets may be hung on racks easy of access. It is hardly necessary to say that all tracings should be kept in a fire-proof vault.

Tables or drawing boards have been devised by the hundreds. Vertical, all sorts of universal, etc., which are good enough for special purposes; but for all-around work a flat table about 3 feet x 7 feet 6 inches, with a hinged adjustable drawing board at one end, gives perhaps better satisfaction than the above mentioned.

For blueprinting, of course, no one would care to be without the cylindrical arc light printing machine. It seems to me that the horizontal style has some advantages over the vertical, on account of the greater ease with which the drawing and paper may be put in. Devices for keeping and cutting the paper and for washing and drying the prints, I shall not dwell upon, as the time and space forbid same.

Quite a good bit of valuable information is distributed by way of catalogues, and it is well worth the time and expense to file such in a case, easily accessible to the draftsmen. By consulting these catalogues one gets to know fairly well what is going on. Of course, occasionally, a weeding out process has to be instituted, but that is easily done.

In a well-established drawing office should also be found a library of technical books for reference. The draughtsman should be allowed to take the books home for study and reference, say for a week. A number of technical papers should be kept for the men, after being read, to be bound and kept for reference. By these means the library would grow very quickly and be a good investment indeed.

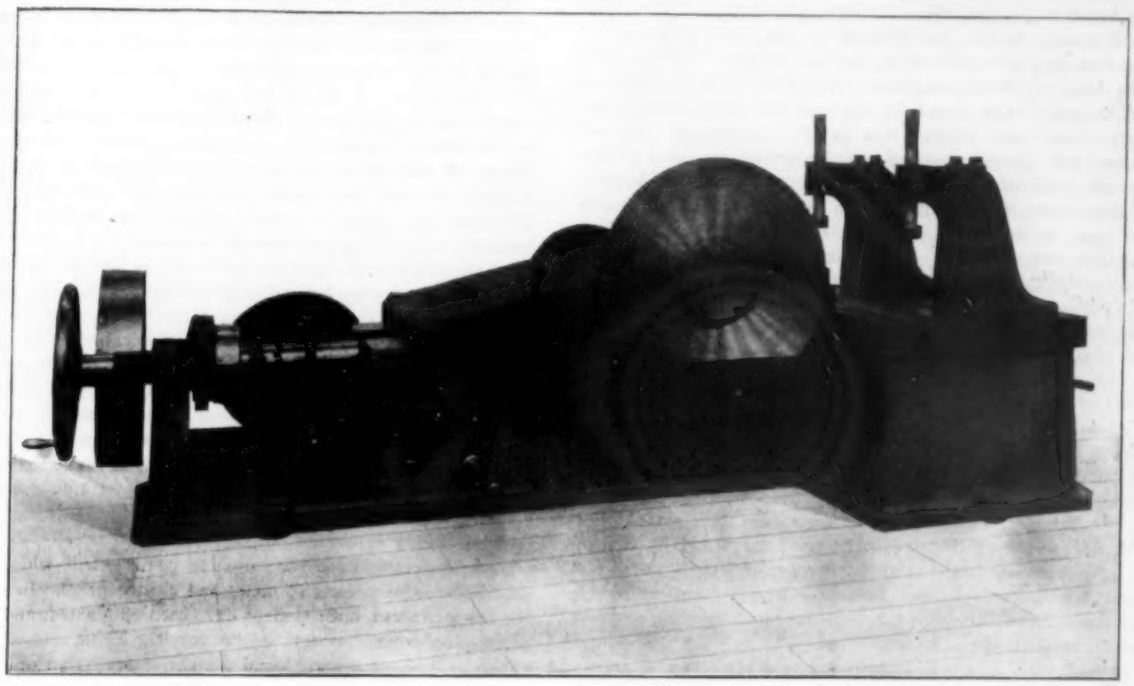
Lastly the correspondence between the different departments and outside parties should be well taken care of, to relieve one's memory, and to be able at any time to prove all transactions.

Amalgamated Copper Co.'s Big Lake Mines.

The Amalgamated Copper Co. is getting into Lake Superior coppers of a different character than the somewhat doubtful propositions it has in the past been associated with there, such as the notorious Arcadian, the difficult Isle Royale, and the fruitless explorations on Michipicoten island. It is now changing stocks in Trimountain for those of Copper Range, and will thus have an interest of importance in the great "South Range group," Baltic, Trimountain and Champion. Two years ago a combination of Baltic and Champion was effected, and it was then supposed that Trimountain was to be included, as it lay directly between and was an integral part of both, so far as economies of production and of management were concerned. Copper Range Consolidated owns a half interest in Champion and Copper Range Railway and most of Baltic. The balance of Champion belongs to St. Mary's Mineral Land Co. and Wm. A. Paine has been a controlling factor. Now the Standard Oil interests own 41 percent of Copper Range and the majority of Trimountain. The three properties have a combined length on the strike of the Baltic lodes of more than four continuous miles, have now 11 operating and producing shafts and 17 miles of openings and are producing daily about 2,500 tons of high class rock. They have milling and reducing facilities for about 3,300 tons of rock daily. The actual net monthly output of refined copper is close to 1,500 tons, nearly half that of Calumet and Hecla, and far exceeding that of any other lake copper property. They have doubtless a mineral value in their Baltic lode far greater than had Calumet & Hecla when it began producing, and they have 3,160 acres of mineral land, much more than C. & H., while the average width of their copper bearing belt, while not as productive, is nearly twice that of C. & H. Champion is their richest rock and is producing now only for four stamps, while six will be working soon. This mine next year can average 1,000 tons of copper monthly. Trimountain should be hoisting 3,000 tons of rock daily in another year. These three great mines are only about four years old, as it was in 1897 that Capt. W. A. Dunn began work on the Baltic ground, the first of the three to be opened into. The dip of the Baltic lode is about 72 to 74 degrees. It is an amygdaloid belt and probably the most easterly yet worked. It is irregular in width, character and extent of copper, but it is persistent, like all lake lodes, and very much richer than most. The three properties are without much doubt the biggest mines ever opened in the Lake Superior region.

COLD SAW CUTTING-OFF MACHINE.

The illustration shows a new cold saw cutting-off machine for bar iron. The saw is 36 inches diameter and is spindle driven, the spindle being driven through a train of cut gearing by means of a steep lead phosphor bronze worm wheel and hardened steel worm. The halftone illustrates the machine as belt-driven, but the addition of a motor drive can be readily made if desired. The carriage of the machine is of a new design and adds rigidity to the tool, producing a smooth even cut. Round bars can be cut up to 12 inches, square bars up to 11 inches, or a number of small bars up to the capacity indicated by these dimensions. The tool has a great range of feeds by means of a variable friction disc and quick power return and has an automatic throw out in both directions



NEW COLD SAW CUTTING-OFF MACHINE.

It is built by the Newton Machine Tool Works, of Philadelphia.

German Iron Exports at a Loss.

Consul-General Hughes, writing from Coburg of the exports of German iron, says:

"In 1902 Germany exported 1,000,000 tons of pig iron and partly manufactured iron, at non-paying rates, more than was exported in 1901. In other words, the export trade was conducted at an actual loss. The Dortmund Chamber of Commerce frankly admits that increase was effected by sacrificing profits—business being occasionally conducted at a dead loss. According to this authority the iron masters had to choose between selling at a loss, or at best without realizing any profit, or limiting their output, and the former was considered the least of the evils. The chamber says that a matter of far-reaching importance to the future of this industry is that the German materials, thanks to the methods adopted by German exporters, have gained a footing in markets and consuming centers which previously knew them only by name, and which, now convinced of their superior qualities, have made arrangements for the continuation of their imports, provided prices prove satisfactory."

The Buckeye Gas & Gasoline Engine Co., recently organized at Aurora, Ill., with $20,000 paid up capital, will not for a time build larger than a 16 horsepower, but intends to build a complete line from 2 to 16 horsepower. Its intention is to build a complete line of combined gasoline engines and pumps suitable for railroad purposes. At present it has what machines it will need, but, within 8 or 10 months, expects to put in an automatic miller and a few other machines.

DESULPHURIZING FOUNDRY IRON.

BY WALTER J. MAY.

That the presence of sulphur in castings is rather undesirable no one will gainsay, and when it exceeds a certain percentage in machine castings every machinist who has paid any attention to the matter will admit that it has serious effects on the working of the metal, leaving out all other questions. Obviously the best course is to use iron, coke, and other material free from sulphur; but too frequently, while care is taken with the iron, no attention is paid to the coke, and instead of having a low sulphur content, for the sake of a few shillings difference in the cost the coke analysis is not taken into consideration. When it is borne in mind that in slow melting the iron picks up sulphur very largely when that undesirable metalloid is present, the question of preventing its admission into the melting furnace shows up very prominently, and the saving in cost made by buying coke with a high sulphur content is more than overbalanced in machining and other costs, and instead of having soft castings we get hard ones. Where, however, the actual users of the materials have no choice in their selection, as so often happens where all purchases are made by someone who studies price only, the coke, etc., have to be used, and it becomes necessary to use some material to reduce the objectionable matters, chalk or some other form of lime generally being used to reduce sulphur, and with varying success, as the mere throwing of lumps of, say, chalk into the furnace is not sufficient to remove the sulphur. So far as the coke is concerned, if it has a sulphur content of, say, 0.75 percent or under, if saturated with clear lime-water and allowed to dry prior to use, the sulphur will most probably affect the iron very little, if at all, when quick melting is effected; but when cokes holding from 1.57 to 2.75 percent are dealt with (35.168 to 61.6 lb. of sulphur per ton of coke), some other method of treating the iron is necessary, as clearly the coke cannot be treated. Marble or hard limestone chips are best for the lime material added, and these should be free from sulphur.

Probably manganese in some form is the best material with which to treat the iron in the cupola, and it should be added in a form that will permit it to pass into the iron in such a way as to affect the whole of the molten metal, spiegeleisen probably being as good a form as any, the proportion of manganese to the total charge of iron being from 1 to 2 percent, in addition to what is contained in the iron itself; but care must be taken not to apply so much as to harden the iron. In regard to this, it must be taken into

consideration that there is usually a limit to the percentage of sulphur allowed in castings, and so long as this limit is not exceeded, the total elimination of sulphur is rarely required; and in regard to this, probably castings showing not more than 0.04 percent of sulphur would generally be accepted as good enough. In fact, for very many purposes a sulphur content anywhere under 1 percent does not seriously interfere with the castings; but over 22 lb. of sulphur to the ton of iron is a pretty heavy dose.

Just lately *Stahl und Eisen* gave the results of some experiments carried out by Herr P. Rensch at Witkowitz with a manganiferous flux, which proved successful in removing the whole of the sulphur in the iron, and preventing the sulphur in the coke passing to the iron. It seems that some form of manganese ore with a clay slate gangue was used in combination with the coke, and limestone was also charged, the result being that from a maximum sulphur content of 0.071 percent in the iron without fluxing, with 3 percent of the flux, only a "trace" of sulphur was shown; but to secure this about 14½ lb. of manganese was added to 675 lb. iron and 800 lb. coke. The carbon in the iron was reduced 0.22 percent, silicon was reduced 0.02 percent, manganese was increased 0.08 percent, and the increase of phosphorus was 0.02 percent, while the sulphur in the crude iron was 0.006 percent. If the whole of the sulphur from all sources had gone into the iron, it would have given 0.089 percent, but as when the iron and coke only were charged the sulphur was only 0.049 percent in the molten iron, the treatment only removed this portion from the iron—or, rather, prevented this amount, less 0.006 percent, or actually 0.043 percent, from entering the iron.

The cost would, of course, have to be considered in the event of the process being adopted; but in ordinary working it is doubtful whether as good results could not be had by other means, because the melting was done with an excess of coke and avowedly under the best conditions for the sulphur entering the iron. With an ordinary quick-melting cupola of 20 in. diameter, 630 lb. of coke would not be used for the bed, nor would 85 lb. of coke be used for a 225 lb. charge of iron, from the fact that 25 lb. of coke, or less, is ample for from 3 to 4 cwt. of iron, according to the construction of the cupola; and naturally, the less coke used, the less sulphur passes in with the coke.

In any case, when desulphurizing is being done, it is essential that all parts of the iron be exposed to the action of the material used, and it would only seem feasible that as the molten metal passes through the coke and slag in the cupola, if the coke holds the desulphurizing medium, it is better than applying some material to the iron before melting. Personally, the writer is favorable to some process for use in the ladle, as in the Saniter process, as this permits of the exact treatment of the whole of the metal at the smallest expense. Chloride or fluoride fluxes, however, cut the linings of ladles very considerably, and for this reason they should not be used in any great excess over what is theoretically required for removing the impurities from the metal.—[Mechanical World.

The Pennsylvania Steel Co. has been awarded the contract for the construction of a highway bridge across the Potomac at Washington, D. C. The contract will be so drawn that the War Department may be enabled to determine at a future date whether the company shall be required to construct a permanent buckle plate and asphalt floor or a temporary wooden floor at the respective prices named by it in its bid, viz., $914,000 for the bridge with the permanent floor and $879,200 for the same bridge with a temporary wooden floor. Congress will be asked for an additional appropriation in order that the permanent floor may be built.

Two legs of the clam shell machine which has been under construction on the new Ashtabula dock during the summer were put in commission last week, and the other two will be ready for operation this week. With the installation of this new dock, which also has a modern car dump coal loading machine, Ashtabula has ample facility and available dockage for boats of any length.

Electrical and Mechanical Methods of Variable Speed Control.*

BY WILLIAM COOPER.

The expression "variable speed control," is capable of three general definitions: (1) Where the speed is variable at the will of the operator, and remains constant when once adjusted, regardless of any change of load or other operating conditions; (2) where the speed is variable at the will of the operator, and may or may not remain constant, depending upon the conditions of operation; (3) where the speed is variable according to some prearranged plan, and is controlled automatically by some inherent property of the apparatus or of the driving power.

In classifying the different kinds of apparatus in accordance with the foregoing definitions, there are found to be some methods that come within more than one definition. For instance, in the operation of direct-current, series-wound motors, the action, so far as the operator is concerned, is in accordance with the second definition, while, from the designer's standpoint, the action is in accordance with the third definition. A general classification, however, would be that mechanical methods come within the first and third definitions; the electrical methods coming within these definitions and holding undisputed possession of the second.

In classifying the different kinds of mechanical and electrical apparatus, they fall under the different definitions about as follows:

First Definition—All methods of mechanical variable speed control, except those used in connection with automatic machinery, come within this definition. The most common method of mechanical variable speed control is the use of the step-cone pulley. Next in point of common use is the use of change gears. Next, change gears in combination with step-cone pulleys. These arrangements are not only the most common, but they constitute probably ninety percent of all the speed-changing apparatus now in use.

Several devices have been used to some extent which are modifications of these step cones and change gears. In some the cones are usd, but the steps have been eliminated, and two reversed truncated cones is the result. These are driven either by a belt passing around the two cones as an ordinary belt would be used, or by a loose belt around one of them, this belt being pressed between the two cones by suitable or unsuitable screws or levers. In either case the belt is moved lengthwise of the cones to vary the velocity ratio of the two cones. This arrangement is the natural outgrowth of the step-cone method, and has the advantage over the step cone of requiring much less time for adjustment and being capable of giving any speed within its range. As an outgrowth of the gear method, there are numerous methods of using clutches, and other ways of getting them in and out of gear. Another method of belt drive consists in using a heavy belt running in grooved pulleys the relative diameters of which can be changed at will. Almost every conceivable arrangement of gears, belts and friction wheels have been used to accomplish this result, some of which have merit and utility, while others are little better than mechanical monstrosities.

The electrical methods that come within this definition are not nearly as numerous as the mechanical, and consist in the use of only one type of motor—the shunt-wound, direct-current motor. There are, however, several ways of operating the motor to give the desired result.

There are three ways of changing the speed of a direct-current motor; first, by changing the e. m. f. impressed upon its armature; second, by changing the strength of its field; third, by changing the number of conductors in series from brush to brush on the armature. The impressed e. m. f. can be changed in two ways: by connecting the armature to circuits of differents voltages, or by inserting a resistance, which may be varied, in the armature circuit. The number of conductors in series on the armature can be changed in several ways. The simplest, and the only one that is used to any extent in practice, is to use two commutators and two separate

*Abstract of paper read at Chicago meeting of the National Electric Light Association.

windings on the armature. These two windings can be connected in series, and if they are identical, they may be also connected in parallel. The series arrangement gives practically one-half the speed of the parallel arrangement. The windings need not, however, have the same number of turns, in which case they may be operated in series for one speed and separately for two other higher speeds. This arrangement of two commutators is very useful where only a few motors are to be installed, but if the number exceeds five or possibly ten, there are other methods that are much simpler and more effective. The field magnetism can be changed in a shunt-wound motor by inserting resistance in the field circuit, and in a series-wound motor by shunting a portion of the current by a resistance in parallel with the field windings.

Any of these methods of changing the speed of a shunt-wound direct-current motor can be used, and come within the limits of the first definition, except that of inserting resistance in the armature circuit. It would then come under the second definition.

Second Definition—There are, from the very nature of the case, no mechanical methods that come within this definition. The series-wound direct-current motor, that holds the street car and traction field against all comers, that does practically all of the crane and hoisting work, the motor of motors for hard work, comes under this definition. The shunt-wound, direct-current motor, when controlled by resistance in the armature circuit, also comes under this definition as well as all direct-current motors that are combinations of series and shunt.

Third Definition—There are many mechanical devices within this class, used mostly in connection with automatic machinery of various kinds. The mechanical device may operate clutches, or may act upon the controller of the driving motor, if the apparatus be driven by an electric motor. These various arrangements are all in the nature of special apparatus, and do not directly enter into this comparison. There is, however, one electrical method that comes under this definition that is of great value in many kinds of work. The series-wound, direct-current motor has an inherent property of varying its speed in inverse proportion to the amount of work it is called upon to do. This property is made use of in the design of motors for street railway and traction purposes. For instance, suppose that it requires 50 horsepower to propel a given car at 30 miles an hour on a level track. Assume that the tractive effort required, under these conditions, be 10 pounds per ton, the car would weigh, approximately, 63 tons. If this car be required to mount a 10 percent grade, the tractive effort required will be 210 pounds per ton; 200 pounds for the grade and 10 pounds for friction, etc. Now, if a constant speed motor be used, it would be required to develop 1,050 horsepower to drive the car up the 10 percent grade. Assume that, due to the inherent regulation of the motor, the speed falls to 10 miles per hour, then the motor will only be required to develop approximately one-third the horsepower, or 350 horsepower. In practice this condition would not require a motor of 350 horsepower, normal rating, neither could one as small as 50 horsepower be used, but a mean somewhere between the two, depending upon what part of the total time the car would be mounting 10 percent grades. It is obvious, however, that there would be an enormous difference in size between the two motors.

Each case where variable speeds are desirable must necessarily be considered by itself, as to whether the method to be adopted will come under the first, second or third definition. The first definition covers the most general application, although there are many cases where absolute limitations of unvarying speed are not necessary, or where changing load or operating conditions can be met by manipulation of the controlling device. It is, however, necessary to use a method that will produce the result set forth in the first definition where constant speed is desired, and the torque, or turning moment required, changes to any considerable amount. Included in this class are practically all machine tools; such as engine lathes, drill presses, slotters, shapers, planers, boring mills, and all machines, which work intermittently, or where the operation is started with the machine in motion.

Aside from, and not a direct function of the variable speed part of the proposition, might be mentioned some of the advantages and disadvantages of electrical and mechanical drives in general. A mechanical drive, be it variable or not, in general means belts; belts mean dust and dirt deposited on walls and ceiling; dust and dirt on walls and ceiling mean a dark room, and less work. An electrically-driven machine causes none of this trouble. In the selection of the method of drive, too little attention is given to this point.

In comparing the electrical and mechanical methods strictly on a basis of speed variation, the comparison might be divided about as follows:

First—Total number of speeds within the range; second—ease of manipulation; third—cost of maintenance; fourth—total range of variation obtainable; fifth—time required to cover entire range; sixth—portability of machine; seventh—space occupied; eighth—cost of equipment; ninth—constancy of speed at any position of controlling mechanism, and tenth—efficiency. In explanation of this classification, it might be said that the points are drawn out in what might seem to be useless detail, because they are all important, and must each be given due consideration. It will be noted that the point of efficiency is placed last, also that the cost of equipment is well toward the last. The number of speeds within the range of variation, or the amount of the change between two steps, has been placed first in the list as being of greatest importance. This means the ability to get an exact speed that is best fitted for the work to be performed. If it is desirable to have any system of variable speed control, it is evident that it is

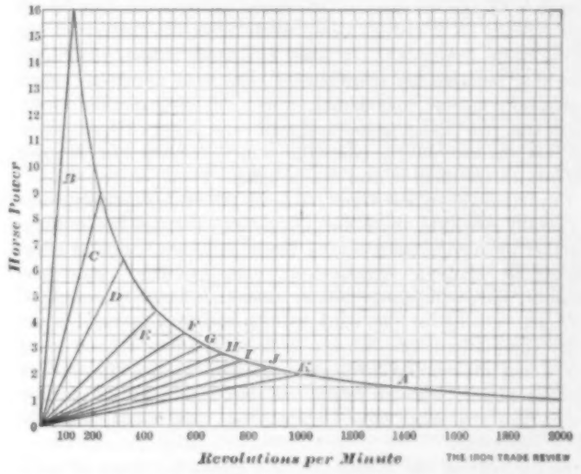


FIG. I.—DIAGRAM FOR DETERMINATION OF MINIMUM SIZED MOTOR FOR SPECIFIED SPEED VARIATION.

for the purpose of getting different speeds. And if different speeds are required, they should be obtained with great exactness.

In comparing the different mechanical and electrical methods, it is found that there are two distinct classes of mechanical devices. One class is composed of those methods where a change from maximum to minimum is made gradually and gives an infinite number of speeds between the two extremes. Another class is where the changes are made in steps, as in the use of step-cone pulleys and change gears. The first class stands alone, as the perfect speed-changing device. Even an electric motor cannot be made to give the same great number of different speeds, for the reason that a motor must be regulated by steps, although it is a very simple matter to make this number quite large and sufficient to meet the most exacting conditions. Step-cone pulleys and change gear arrangements, when carried to the point of yielding the same number of different speeds, become very complicated. While it is entirely possible to get a change in this manner of 10 percent per step, the complications resulting from the mass of gears and multiplication of steps on the cone pulley would not be permissible, to say nothing of the time lost in making the changes. As a result of years of practice, this system has developed into an arrangement where the changes are approximately 50 percent per step; that is to say, each increment of

increase is 50 percent; often as much as 100 percent. It is obvious that such an arrangement must be very wasteful of time, as it will often occur that the work in hand will not quite permit of a certain combination, and must necessarily be run at the next lower speed, consuming more time for a given operation than would otherwise be required.

There is also another fact that should not be lost sight of in this connection. The range of speeds given by the step cones on a great many machines is not consistent with the ratio of the back-gearing used. That is to say, it is frequently found that the difference between the lowest speed with the back gears out and the highest speed with the back gears in, is very much greater than the difference between two cone speeds. Some machines have as much as three-to-one variation in speed between these two conditions. As a case in hand, might be mentioned a comparatively small sized boring mill, made by a prominent manufacturer, in which the back-gear ratio was twelve and one-half to one. Assuming that the cone speeds were consistent with this back gear ratio, the average difference in speeds throughout the entire range would be about one and nine-tenths to one, the machine being equipped with a four-step cone. This is certainly a very crude solution of the problem of variable speed control, and yet there are thousands of machines no better than this in everyday operation in manufacturing establishments, where they are supposed to be running things to the limit, and on the most economical basis. The crudest kind of apparatus that would subdivide the speeds of such a machine would certainly produce superior results.

Ease of manipulation in the apparatus used should be well considered. If the device requires considerable manual effort on the part of the operator to effect the changes, there is much less liability of a change being made when the nature of the work really demands it. It also, as a rule, follows that a device that requires any considerable amount of effort to operate will also consume considerable time. All of that class of devices that use change-gears and step-cone pulleys require more or less manual effort, especially where friction clutches are used to throw them in and out of gear.

Cost of maintenance should also be given due consideration. Generally speaking, the piece of apparatus that has the smallest number of moving parts will be the most durable, and an effort should be made to eliminate all parts possible. Most mechanical speed-changing devices that fulfill the requirements and are worthy of the name of speed-changing devices are quite complicated, and embody in their structure a great many parts that are subject to a great deal of wear. The modern electric motor, without doubt, requires less attention for repairs than any other piece of apparatus that would fulfill the same functions.

In considering the installation of a method of variable speed control, the total range of variation is one of the first problems to be solved. The machine to which the device is to be applied calls for certain maximum and minimum speeds, these maximum and minimum speeds, of course, being determined by the work that the machine is intended to perform. With the exception of such machines as are operated day in and day out on one particular and specific operation, almost any machine used in manufacturing, or in an industry of any kind, could be worked to advantage at different speeds.

The class of machinery that probably requires the widest range of variable speed, comprises machine tools; especially is this true of that class of machine tools that operate upon cylindrical work. In all the different methods of variable speed control, when applied to machine tools, recourse is generally had to some arrangement of gearing. An electric motor would be out of all proportion if designed to cover the wide range of speed variation called for in an ordinary engine lathe.

The total speed range of machine tools that operate on cylindrical work should not be less than sixty to one, although in some special cases a very much narrower range than this will suffice. In equipping such a machine with an electrical method of variable speed control, if an attempt is made to cover this entire range inherently within the motor, the motor would be abnormally large and expensive, although it is possible to do this. The use, however, of one set of gears in connection with the machine simplifies the proposition very materially. In the class of machine shop tools in which the work has a constant relative motion to the cutting tool—as in planers, slotters and this class of machines—and speed variation is only required for different kinds of material, the total range can be easily covered by the mechanical devices in use, or by the inherent speed regulation of an electric motor.

If the range of variation of the method employed necessitates the use of one set of back gears in order to make the method practically operative, the question will naturally arise, why not use two or more sets and still further simplify the speed-changing device, or reduce the size of the variable speed motor? Duplicating the gearing indefinitely until variations in speed are entirely taken care of in the gearing, brings us to a mechanical speed-changing device pure and simple, in which the changes are all brought about by different combinations of gearing. The use of one pair of gears is objectionable because of time consumed in the manipulation, and also because of the wear and tear; consequently, a multiplication of gearing multiplies these objections.

The advantages of having any machine entirely independent and portable are too well known to need much illustration. It enables one to locate the machines in the best possible position for the facility of handling material, and if at any time the process is changed, the machinery can be readily changed to suit. The machines can be placed under traveling cranes in such a position that they can be served to the best possible advantage. It often occurs that some simple operation is required on a large amount of material, in which case the machines can be taken bodily to the work at a very much less expenditure of time and labor than would be required to bring the material to the machine. The advantages gained by the portability of machines makes a direct comparison of the electric drive with any mechanical system of drive very difficult, as no mechanical system can be said to embody this feature in the slightest degree.

In equipping a new plant or factory of any kind, a careful summation of all the costs in connection with the different systems will show that there is but little actual difference in the total first cost. In the individual application of motors to machinery, the cost of the motor and its accessories increases the cost of the individual application of motors to machinery, the cost of the motor and its accessories increases the cost of the individual machine very materially, but when the decreased cost of the building, owing to the absence of heavy lines of shafting, is taken into consideration, a very material offset is found. When compared with the actual cost of the installations of the mechanical speed-controlling mechanism, a still further offset in the cost is found.

In equipping old machinery with variable-speed-controlling devices the proposition is somewhat different. The investment for transmitting power to the machinery has been made, the building has been constructed with a view to carrying the necessary line shafting, countershafting, etc., and this has all been installed. The proposition of a very much increased investment at once confronts the would-be purchaser, if he considers the installation of individual electric drive. He naturally turns his attention to the mechanical methods of variable speed control, and finds that he can install some of these systems at a very much less cost. In justice to the mechanical systems of variable speed control *that fulfill the requirements*, it must be said that under these conditions they certainly accomplish the results sought. However, considerable expense is involved in the installation of such a device, and usually an increased cost of operation. These points should be given due consideration in comparison with the radical changes to individual electrical drive.

The electric motor is to most people operating manufacturing plants and establishments of different kinds, a rather mysterious thing. This, coupled with the poor behavior of some motors that they may have come in contact with, has caused them no little apprehension and doubt as to the capabilities and durability of the modern electric motor. This condition of affairs has made it a good deal in the nature of "buying a pig in a bag," to the average purchaser, and it must be admitted that in a good many cases this was actually the fact. The modern electric motor, however, has developed into a reliable machine, to be depended upon for hard work and faithful service; and although the cost may seem considerable when compared with some other systems of operation, when all the facts are taken into consideration, the first cost of a new installation is not materially different.

The only mechanical methods of variable speed control that

ar really worthy of consideration are those in which any number of different speeds may be obtained, and, from the very nature of the case, some form of friction drive must be used. This may be a belt drive, or one of the many kinds of friction wheel arrangements. These friction arrangements are at best not thoroughly reliable and consume considerable power in their operation. On the other hand, an electric motor, when used as a variable-speed device, has one drawback; the speed is not absolutely constant, due to the "drop" in the armature, by virtue of the resistance. This characteristic when the motor is used on very low voltages, makes the inherent regulation from no load to full load in some cases very poor. This point should be well guarded against in the design of motors for this service. A motor used to operate an engine lathe, for instance, which will drop twenty-five or fifty percent in speed when the tool is applied to the work, will not give satisfactory results. Neither will a mechanical device that has a propensity for slipping whenever called upon to do hard work give satisfactory results. Any device used for the purpose of variable speed control should be able to drive the machine to which it is applied under any and all conditions, from the very lightest to the very heaviest work that it may be called upon to do, without showing a variation in speed of more than a few percent. A great many arrangements for variable speed control have proven entirely unsatisfactory for this reason. Many attempts have been made to operate machine tools with motors where the speed regulation was obtained by resistance in the armature circuit. These, without exception, have proven failures. There are some instances, however, where a small amount of resistance is used in the armature circuit in connection with multi-voltage systems of control that have not proven failures, but the results obtained are not what they should be, although the general result of these applications may have been satisfactory.

A comparison of the efficiencies of the various mechanical methods of speed control with the various systems of electrical speed control is not altogether favorable to the mechanical system. An electric system, even when using very small motors individually applied to very small machinery, will show a better efficiency from the prime mover to the work than any mechanical system of power distribution, except in cases where the number of machines driven is very small, and the power from the prime mover is applied directly to the machines. Of course, due consideration must be given to the size and type of the motor installed, when using the electric system for power distribution, due regard being had for the average working conditions. The reason that the electric systems of power distribution, in case of individual motor application, show higher total efficiencies, is, of course, that when no work is being done, no power is consumed; while with the mechanical system of power distribution there is always a friction load. It is not at all uncommon for the friction load of a manufacturing establishment to be 50 per cent of the maximum load on the prime mover. In an electric system of power distribution, the conditions would be very bad indeed if the power factor were not higher than this.

In the intallation of a new manufacturing plant in which machinery will be installed that will require to be operated at varying speeds, the methods employed should be considered in about the following order: First—what system will assist in yielding a maximum output from the machinery installed; second—the comparative costs of the different methods installed. Mr. L. R. Pomeroy, in a paper read before the Central Railway Club, in Buffalo, November 14, last, quoted a celebrated authority as follows: "Where we have to decide whether we shall install one large motor or a number of small ones, I would give preference to the small motors down to a limit of five horse-power for light machines, and ten horsepower for heavy machines; this for cases in which the problem is one of distribution only. Where the introduction of motors would have any effect on the product, I would dismiss entirely the question of power and decide solely with regard to the convenience of operation afforded, and would not hesitate to put in the very smallest motors mounted upon any kind of machinery, notwithstanding their greater cost and lower efficiency, if they even to but a slight degree increase the product of the labor of the shop. Gains in this direction cause other gains to sink into insignificance."

In this comparison, the authority quoted is only comparing small motors with large ones in the point of efficiency. The point of this remark is that any gain in the increase of the production of the labor of the plant is of more importance than any other consideration. It is a very simple matter to calculate how much the production will have to be increased to offset a given investment. When this calculation is made it is easily seen that a very slight increase in the production will offset a very large investment.

When an attempt is made, however, to make an exact determination of the increase in the production, due to the installation of any important apparatus, it is found to be a very difficult thing to do. The introduction of a traveling crane into a plant handling even comparatively light material, is always accompanied by an increase in the output, although the labor item may not be very materially reduced. The reason for this is not hard to find. Although the same number of men may be employed on a given floor space, the amount of material that these men can handle is increased for the simple reason that only a certain amount of crowding of workmen or machinery into a given space is permissible. The same thing is true of the introduction of apparatus that will hasten the production of the machines themselves.

Great care should be exercised in the selection of motors for different machines to determine whether the horse-power required is practically constant or varies with the speed. In most machines of a reciprocating action—slotters, shapers, planers, etc.—the power required varies with the speed, as the power is consumed in the reversals of the machines, and not in the actual work being done. In cases of this kind, the motor will be called upon to do its maximum work at the maximum speed of the machine, while in the case of machines in which the work performed is constant, irrespective of the actual speed of the machine itself, the power required to drive it will be practically constant through the entire range of variation. In machine-shop tools such as lathes, boring mills, milling machines, etc., this condition exists.

When the range of different voltages impressed upon the armature of the motor and the range through which its speed is changed by changing the amount of magnetism in its field, are properly proportioned, the minimum-sized motor for a given total speed variation is obtained. This can readily be seen from the curve in Fig. 1. In explanation of the use of the curve in any given instance: if the speed range has been determined—as well as the maximum and minimum speeds—the full field full-speed voltage can be ascertained from the curve as follows: Locate on the curve *A* the point corresponding to the maximum speed which it is desired to operate. Trace to the left from this point to the marginal scale and read the horse-power. This horse-power may not be the actual horsepower in any given case, but it can be assumed as proportional to the actual horse-power required. Again trace from the minimum speed, which it is desired to operate, vertically, until the horizontal line which represents the same horse-power that was determined from the curve *A* is reached. Through this point draw a straight line from the origin *O*, intersecting the curve *A*. From this point of intersection trace downward to the base line and the full voltage, full field speed of the motor will be found.

To get the minimum speed we must use some other method than field control, because the field is already up to its maximum strength, and we therefore introduce a lower voltage. The ratio that this lower voltage bears to the normal voltage is the same as that which the lower speed bears to the normal speed. By this combination of multi-voltage and field control we are able to use the minimum size of motor for the given work.

The following few simple rules may be of use in determining the relative size of motors for constant horse-power application:

First—The total range of speed, using both variable voltage and field regulation, will be as the square of the range of voltages.

Second—The change in horsepower will be directly proportional to change of voltage impressed on the armature, the field being constant.

Third—The change in horsepower by change of field strength will be inversely proportional to the change in speed, the voltage on the armature remaining constant.

Fourth—The relative size of the motor, as referred to the maximum speed, will be directly proportional to its speed variation, when using variable voltages.

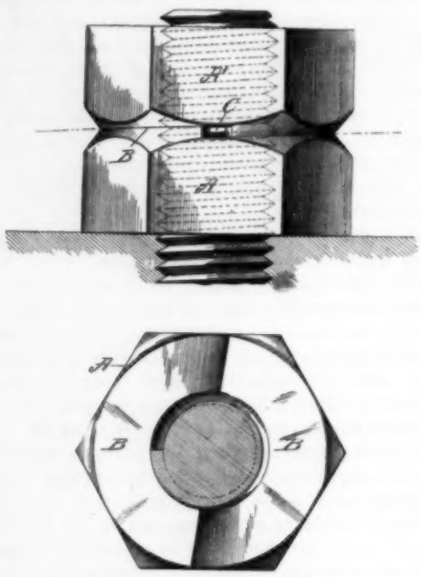
Fifth—The relative size of the motor, as referred to the maximum speed, will be as the square of the speed variation when using field regulation.

ANOTHER SOLUTION OF THE LOCK NUT PROBLEM.

Lock or check nuts are a prolific source of tribute to the Patent Office and every week one or more specimens emerge and usually are soon forgotten. One of these attempts to produce a useful and at the same time an economical nut is sufficiently out of the beaten track to merit description. The nuts are alike and therefore interchangeable, and the locking surfaces are so formed that the engaging surfaces may be shaped in the same press and at the same time as the operation of blanking or perforating the nut. After this operation nuts are so tapped as to bring the engaging surfaces into locking position when the two are placed face to face.

The illustration presents an elevation and a plan of the nuts in a locked position upon a bolt which for convenience of illustration is let into a base. In order to accomplish the object of the inventor, the nuts, whether square, hexagon or any other shape, having one face, as is usual, in a plane perpendicular to the axis, are provided on the other side with one or more spiral planes having the same direction of turn, but of less pitch than that of the threads of the central opening. These spiral planes have the same axis as the threaded hole.

The inventor considers the degree of pitch and the direction of turn most important. It is essential that the pitch of the spiral surfaces be less than that of the nut thread. A and A' are the nuts, and the faces of the spiral planes are repre-



A NOVELTY IN CHECK NUTS.

sented by B. The opening C is the space generally remaining after the outer nut A' is screwed home upon the inner nut A. It is recommended that in the case of machine bolts, say ½-inch, regularly threaded in 10, 12 and 14 pitch, the entire output of nuts could be made with differentials of 15. The engraving shows the slight variation of the differential surfaces from the flat plane and the locking effect will be readily understood.

The device has been patented by Julian H. Rivers, of St. Louis, Mo.

The creditors of the Norcross Bros. Co., Worcester, Mass. which recently went into the hands of a receiver, have agreed to a plan of reorganization, which will allow the business to be continued. There will be two incorporations, one the Norcross Construction Co., which will carry on the contracting business, and the other the Norcross Bros., incorporated which will be a holding company, owning all the stock of the construction company, and controlled by trustees elected by the bondholders. The court has given permission for the carrying out of the $1,700,000 contract with Harvard University for the new medical college buildings.

The plant of the Empire Plow Co., at Ensley, Ala., is now in operation in some of its departments, and in a few weeks will be in operation throughout.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Southern Machine Mfg. Co., Richmond, Va., is preparing to issue $30,000 of preferred stock for the purpose of enlarging and improving its gasoline engine and general machine works.

The Kentucky Gear & Machine Co. Louisville, Ky., is figuring on boilers, engines, metal-working machinery, etc.

D. F. Hill & Co., Manufacturers' Record Bldg., Baltimore, Md., are in the market for a 25 to 30-horsepower locomotive boiler, second-hand, in good order.

The Norton-Edgar Can Co., Ludlow, Ky., has been incorporated, with capital of $100,000; H. M. Norton, president; M. W. Edgar, vice president, and J. J. Moser, treasurer. The company has leased a plant formerly occupied by the American Can Co., has installed small machine shop and placed contract for canmaking machinery.

The Philippi Mine Supply Co., Philippi, W. Va., will purchase patterns and equipment for foundry, including cupola, and foundry supplies.

The Kentucky Plow Fender Co., Hawesville, Ky., wants 20-horsepower engine and boiler, threader, shear to cut 14-gauge sheet iron, punch to punch seven ¼-inch holes in ¼-inch bar iron.

The D. L. Casey Machine Co., Springfield, O., is in market for heavy boiler-plate punch with not less than a 24-inch throat and capacity of ⅞-inch holes in ½-inch plate; also one heavy set of boiler-plate rolls.

At Pensacola, Fla., W. F. Creary, E. E. Reese and J. C. Avery have incorporated the Gulf Machine Works, with capital of $20,000, for conducting machine shop and foundry.

At Atlanta, Ga., A. G. Rhodes, J. D. Rhodes and W. J. Wood have incorporated the Walter J. Wood Stove Co., with capital of $3,500 and privilege of increasing to $50,000, for manufacture of stoves.

At Tallapoosa, Ga., S. N. Noble and W. M. Kelley have incorporated the Southern Car Wheel Iron Co. for purpose of operating an iron furnace; capital $100,000.

The town council, Big Stone Gap, Va., wants to buy new or second-hand 25-horsepower boiler and a steam pump capable of pumping a three-inch stream into water main at 100 feet elevation.

The Zimmerman-Rock Machinery Co., Utica, N. Y., has been incorporated with a capital of $5,000, by Bernard Zimmerman, G. A. Zimmerman, Roger J. Rock and G. B. Rock.

The Diamond Stove Co., with a capital of $100,000, of which $52,200 is paid in, has been organized at Detroit by the following incorporators: Newton J. Cary, R. A. Parker, George C. Thrall, Burton L. Peck, Felix A. Lemkie, Charles F. Burton, Frederick Marriott and Nicholas Huff.

The Litchfield Engine & Machine Co., Litchfield, Ill., has been incorporated with a capital of $100,000.

The Hunt & Dorman Mfg. Co., Cleveland, capital $10,000, has been incorporated by Jas. T. Hunt, Edwin H. Dorman, Carrie E. Hunt, J. Fred Hunt and Temple W. Dorman. The company will engage in metal stamping.

The William Ferguson Foundry Co., Chicago, has changed its name to the Ferguson & Lange Foundry, and has increased its capital from $25,000 to $50,000.

The Kock Mfg. Co., Grinnell, Ia., has been organized with a capital of $18,000, to do a foundry and machine business. The business men of Grinnell are asked to purchase a lot and erect a two-story building 60x100 feet, with a one-story building 40x60 feet, to be leased to the company for 10 years.

The Edison Foundry & Machine Works, Edison, Ohio, whose recent incorporation has been mentioned, is in the market for complete foundry and machine shop equipment, including an engine of about 30-horsepower capacity.

The Railway Steel Spring Co., capital $10,000, has been incorporated at Denver, Colo.

The Frankfort Brass Works Co., Frankfort, Ind., has issued bonds to the amount of $10,000, and will add more machinery and a large stock to its plant.

W. J. Johnson of Yellow Springs, O., and A. J. Baker of

Springfield, O., are organizing a company with a capital stock of $100,000, to manufacture a motor spring, the invention of William Coulthar.

Fires and Accidents: —

Fire in the two-story frame building occupied by the Illinois Malleable Iron Works, Chicago, caused a loss of $1,500, Sept. 4.

The Ideal Stove & Foundry Co.'s plant at Daleville, Ill., was destroyed by fire Sept. 7. The loss is estimated at $100,000.

Two men were fatally injured and two seriously hurt in an explosion of a steam separator at the Bessemer plant of the Republic Iron & Steel Co. at Youngstown, Sept. 6. The men who were injured were all employed at important positions about the plant.

New Construction: —

The Waltham Machine Works, Waltham, Mass., will build an addition 65 feet long, one story and a basement. The company manufactures machinery for watch, clock and similar factories.

The Automatic Haulage Co., Terre Haute, Ind., expects to erect shops in Terre Haute for the manufacture of an endless rope haulage for use in mines, quarries, etc. The company will soon be ready to take up the purchase of machinery, none of which has been ordered.

The Atlantic Coast Line Railroad will remodel its machine shops at Florence, S. C., and double their capacity.

The new building of the MaGirl Foundry Co., Bloomington, Ill., is nearly completed, but the machinery will not be installed and the plant be in full operation until about the first of December.

Perkins & Co., Grand Rapids, Mich., broke ground a few days ago for their new foundry. This building is to be completed and equipped during the fall, and will be of concrete construction, 64x80 feet.

The new Great Northern locomotive repair shops at St. Paul, Minn., will be ready for operation about Dec. 1. The present shops give employment to about 800 men. When the new shops are opened, this number will be increased to from 1,400 to 1,600 men. The new shops will be devoted entirely to the repairing of locomotives while car repairing will be done at the old plant. The improvements represent an expenditure of about $1,000,000. The plant includes 7 large buildings. The office building, a two-story structure, will accommodate the officers and clerks, and will also have a complete laboratory. The machine shop and erecting plant is a two-story building 150x600 feet, divided in the center by a row of columns running through the center into the machine shop and erecting room. The tank, boiler and blacksmith shops are under one roof, the building being 235x425 feet. In the rear of this building, and extending 450 feet along the line of the main yards is the main storehouse, while a little farther to the east is the iron storehouse, 100x200 feet, and still farther to the east are the docks. All the machinery in the plant, covering 7 acres of ground, will be driven by electricity. The power plant is 106x110 feet, divided by a brick partition into boiler and engine rooms.

Several of the buildings of the Rock Island Railroad shops at Moline, Ill., will be completed by Oct. 15. It is the plan of the company to provide this year for a large amount of repair work. A large quantity of machinery to equip the plant has already arrived on the grounds.

The Birmingham Drop Forge & Machine Co. has secured a tract of 5 acres at Bessemer, Ala., and work on the new plant will be begun at once. The plant will turn out all kinds of drop forgings and will have a machine shop for general work.

The new plant of the Worthington Pump Works, Newark, N. J., now being built to take the place of the industries at Elizabeth and Brooklyn, is well advanced in construction, but it will be a year before the shops are ready for operation. The buildings cover 30 acres. The main foundry will be 600x141 feet. The walls of the main machine shop, which will be 1,006x123 feet, are nearly up to the roof. The high erecting shop, four stories, is 150x124 feet, while the ordinary erecting shop is 600x123 feet. Next to the machine shop, and separated from it by a space of 100 feet, is the four-story pattern shop. There will be a power house, 174x118 feet, a machine shop 40x66 feet and a cleaning shop 200x60 feet.

The increase of business at the Benicia Agricultural Works, Benicia, Cal., has necessitated increased facilities. Plans are now being considered to enlarge the foundry to almost double its present capacity by building an annex on the south side of the present building. The largest force of moulders ever employed by the works is now on the pay roll. All the other departments are very busy.

In addition to other extensive improvements that have been made by the Eastern Steel Co., at Pottsville, Pa., the company has engaged the Garrett-Cromwell Engineering Co. of Cleveland to prepare plans for the reconstruction of the blooming and billet mills. It is expected that steel will be turned out at the new mills not later than Jan. 1. The entire cost of the new construction and reconstruction by the Eastern Steel Co. will be about $1,200,000.

The Southern Steel Construction Co., recently organized at San Antonio, Tex., has begun the erection of a new plant. The product will be structural steel work for jails.

The Illinois Nail Co., Chicago, will build a manufacturing plant and warehouse at Lessing street and Chicago avenue, which will be two stories, 50x100 feet, of mill construction, and will cost $20,000.

The Belmont Iron Works, located at the corner of Twenty-second street and Washington avenue, Philadelphia, has decided to move the plant to Holmes Station, Prospect Park. The company proposes to move the entire works, which are at present scattered, owing to lack of room at its present location, to the new site of 7 acres. The company's specialty is iron and steel for building construction.

The Prouty-Pierce Locomotive Mfg. Co., Kansas City, Kan., is preparing to establish a large plant for the manufacture of gasoline locomotives for suburban and interurban service. A site of four acres has been acquired. One section of the plant will be constructed this fall, and about 75 men will be employed throughout the winter. Next summer the plant will be finished, and it is expected that about 500 men will be employed. Machinery for the first section has been ordered. Enoch Prouty, president of the company, states that orders amounting to $500,000 are already in hand.

The Denver Castings Co., recently organized with a capital of $500,000, of which $300,000 will be invested in machinery and buildings, has purchased 30 acres in South Denver, and will begin the erection of buildings at once. The company has authorized an issue of $250,000 of special 6 percent bonds. The plant will cover from five to six acres. There will be two openhearth, acid, oil-burning furnaces, each of which will have a capacity of 45 tons. The main building is to be 250x130 feet, pattern making and pattern storage building 140x35 feet, and a power house 100x52 feet. The entire works will be lighted with electricity, which will also be used for motive power.

Contracts have been let by the Baltimore & Ohio Railroad amounting to $312,000 for construction work in the Glenwood, Ill., yards and shops. One company will build a roundhouse, trainmen's building, boiler plant, electric lighting plant, hot wells, slushing tanks and sewer buildings. The improvements contemplated at that point will cost fully $1,000,000; included in this amount will be $400,000 that will be spent for new machinery and shop equipment.

A brick addition, two stories, 20x60 feet, will be made to the plant of the John Rice Foundry & Machine Works, Stevens Point, Wis. A new ten-ton cupola and other equipment will be installed.

The Darling Pump & Mfg. Co., Williamsport, Pa., is building a new foundry, which will soon be in operation.

The Pittsburg and Valley Districts: —

The work of removing machinery from the Allegheny, Pa., plant of the Liggett Spring & Axle Co., to the company's new plant at Axleton, on the Monongahela river, has already been commenced and it is probable that the entire Allegheny plant will be shut down about Oct. 1, when the new plant is to be placed in operation. Charles E. W. Champ, president of the company, has resigned, for the purpose of retiring from active business, but his successor has not yet been elected.

The 8 and 9-inch mills of the Sharon Steel Hoop Co.,

Sharon, Pa., resumed operations last week, after being shut down for a week for repairs. The bar mill also resumed operations.

The Greenville, Pa., plant of the Shelby Steel Tube Co. has been closed down for repairs and the installation of new machinery.

Repairs on the furnace of the Sharpsville Iron Co., Sharpsville, Pa., have been completed and the furnace put in blast.

Nine of the puddling furnaces of the Lockhart Iron & Steel Co., McKees Rocks, Pa., are idle.

On Tuesday, Sept. 8, the ten mills of the Shenango plant of the American Tin Plate Co., New Castle, Pa., which were damaged by fire several months ago, were placed in operation. The entire 30 mills of the plant are now operating in full.

The Wayne Iron Works of Brown & Co., Pittsburg, are idle at the present time. No date has been fixed for a resumption.

Bair & Gazzam, builders of machinery, Pittsburg, have been granted a permit to erect a four-story plant at 29th and Smallman streets, Pittsburg, to be 120 feet long and 120 feet wide. The estimated cost is $150,000. The building will be built of brick and steel.

The National Novelty Corporation, of New York, is having an appraisal made of the plant of the Logan & Strobridge Iron Co., New Brighton, Pa., with a view to purchase. The deal will be closed shortly.

At the annual meeting of the stockholders of the Pope Tin Plate Co., held at Steubenville, O., last week, directors were elected as follows: H. C. Franzheim and George W. Baron, Wheeling, W. Va.; D. J. Sinclair, Steubenville, O.; Charles E. Pope, S. V. Huber, Alexander Laughlin and E. M. Mudge, Pittsburg.

General Industrial Notes:—

C. O. Newlon, F. A. Newlon, Andrew Z. Barbee of Shreveport, La., and G. A. Newlon of Weston, W. Va., have purchased the Carr foundry and machine shops at Grafton, W. Va., and will organize a $25,000 company to operate same.

The Gibson Heater Co., now at Muscatine, Ia., will move to Fort Madison, Ia. The company has purchased a building formerly used by the Griffin Wheel Works at Fort Madison, which is well adapted for its purpose. People of Fort Madison have subscribed and paid for 50,000 shares of stock of the company.

The Bundy Time Recorder Co., Syracuse, N. Y., has bought the plant of the Olive Wheel Co., and in a few days the company will be incorporated with $500,000 capital, to manufacture time recorders.

The Roberts Car & Wheel Works, Three Rivers, Mich., has been sold to a local company with the following officers: President, Geo. T. Wolf; vice president, James Donovan; secretary, Horace Roberts. The name of the old firm will be retained by the new one, and the business will be enlarged.

The Bradley Co., and C. C. Bradley & Son, Syracuse, N. Y., manufacturers of power hammers and forges, who have heretofore operated in rented buildings, have moved their machinery to their new plant. The buildings formerly occupied by the Bradley companies will be used by the Syracuse Chilled Plow Co. for molding, blacksmithing and storage purposes.

The new foundry of the D. R. Sperry Co., Aurora, Ill., has commenced operation. The old plant was destroyed by fire. The new building is 225x70 feet, and is fireproof.

The firm of Arthur Koppel has been awarded the contract for the building and equipping of a narrow gauge railroad about 400 miles long, by the Otavi Mining & Railroad Co. The railroad is to be used in the service of the copper mines in the district of Otavi and Tsumeb in southwestern Africa. The total cost of building the road is approximately $4,500,000. The firm of Arthur Koppel has formed a company with several German banks to build this road, which has to be finished within 2½ years. Arthur Koppel builds and equips the road complete, including rails, steel ties, rolling stock and all the other equipment.

The Liberty Iron Co's furnace at Shenandoah County, Va., recently purchased by St. Louis capitalists, is being repaired, and will be blown in at an early date.

The Ohl Machinery Co., Newark, N. J., has been reorganized and is now the Ohl Automatic Machine Co. The plant will be enlarged and will be equipped to design and manufacture special machinery, tools, etc. It manufactures the Ohl automatic painting, varnishing and lacquering machine, lifting jacks and water filters.

John Fenwick has purchased the foundry of Brown & Colburn, Bowling Green, Ky. Mr. Fenwick will install a large amount of new equipment and will operate the plant by electricity. The company hereafter will be known as the Bowling Green Machine Co.

J. W. Tutzel, of Ottawa, Ill., who manufactures earth boring and rock drilling machinery, has arranged to transfer his business to Niles, Mich. The new concern will occupy quarters in the upper story of the Garden City Fan Co.'s building, and will employ 50 men.

The new plant of the Liggett Spring & Axle Co., at Axleton, Pa., the new town on the Monongahela river, above Elizabeth, will be ready for operation about Oct. 1. The plant is the largest of its kind in the country. In Allegheny about 350 men were employed, but at Axleton this number will be increased. The company will abandon its plant at Allegheny, but will retain its general office in Pittsburg.

The Trebert Gas Engine Co., Rochester, N. Y., recently incorporated with a capital of $50,000, is a consolidation of H. L. F. Trebert & Co. and the Morris & Corkhill Motor Cycle Co. The company has a plant equipped with machinery suited to its requirements in building water and air cooled motors for automobiles, marine and stationary.

Carleton E. White, as referee in the voluntary dissolution proceedings instituted by the Buffalo Spring & Gear Co., Buffalo, has filed his report in court stating that the company had gone through bankruptcy and should be dissolved. The report was confirmed by the court.

The Smith Premier Typewriter Co., of Syracuse, N. Y., has recently purchased a 500-horsepower cross compound engine direct connected to an alternator, from the Ball Engine Co., Erie, Pa.

The American Bridge Co. has filed a petition in the court at Franklin, Pa., asking that the plant of the Grant Tool Co. of that city, be sold by the receiver. It is claimed that the plant is only paying operating expenses, and that to continue would wear out the machinery without profit. The bridge company has a cleam for $8,241. A receiver was appointed six months ago.

There has been such an increase of business at the D. S. Abbott Co.'s works, Olean, N. Y., that the proprietor, C. P. Luther, has decided to start up the foundry, which has been out of use several years.

Frank M. Byam, Benton Harbor, Mich., manager of the Gillette Roller Bearing Co. of that city, has opened offices in Grand Rapids, Mich. The company has bought two acres in Grand Rapids, and proposes to install machinery in a two-story building now standing on the site. The company was organized in Benton Harbor in 1890, and has a capital of $100,000. The officers are: President, Richard G. Peters; vice president, H. B. Gillette; treasurer, Henry W. Carey; and secretary, Raymond B. Gillette.

The importation of iron and steel into the Philippines for the ten months last reported, as compared with the corresponding period of 1902, shows a marked decrease. The share of the United States in the imports has become insignificent. For example: The value of the imports of bar iron in 1903 were $45,895, and only $537 worth of that amount came from the United States. It is expected that President Roosevelt will ask Congress to pass a bill to reduce duties on Philippine products imported into the United States. This is considered necessary for the United States to hold its trade or to make any headway in the island possessions.

The Rock Island Railway has issued a circular in which it says that 1,000 men will be employed in the new shops at Moline, Ill., during next year, and that the working force will be increased to 8,000 as rapidly as shops can be coonstructed.

Lack of banking facilities in Fulton, Ill., and the recent failure of two corporations in which the Steel Brick Siding Co was interested are said to be the reasons for the failure of that concern, for which a receiver in bankruptcy has been appointed.